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SV660F Series Servo Drive

Selection Guide

Industrial Automation | Intelligent Elevator | New Energy Vehicle | Industrial Robot | Rail Transit

Data code 19011667 A02

Preface

Introduction

The SV660F series high performance AC servo drive provides a power range from 0.05 kW to 7.5 kW. It supports Profinet communication protocol and carries Ethernet communication interfaces to work with the host controller for a networked operation of multiple servo drives.

The SV660N series servo drive supports stiffness level setting, inertia auto-tuning and vibration suppression to simplify the operation process. It allows a quiet and stable operation through cooperating with the MS1 series medium-to-small inertia high-response servo motors configured with a 23-bit multi-turn absolute encoder.

It is suitable for lithium battery PACK, printing and packaging, logistics, automobile manufacturing, tobacco and other industries to achieve fast and accurate collaborative control.

This manual provides instructions on product selection, including the list of supporting components, technical data on the drive and motor, and the selection guide of cables.

More documents

Name	Data Code	Description
SV660F Series Servo Drive Selection Guide	19011667	Provides instructions on product selection, including the list of supporting components, technical data on the drive and motor, and the selection guide of cables.
SV660F Series Servo Drive Hardware Guide	19011666	Presents electrical design guidance of the equipment, description of terminals, required certificates and standards and solutions to common EMC problems.
SV660F Series Servo Drive Commissioning Guide	19011668	Presents servo commissioning, parameter descriptions, including the operating panel, commissioning software, commissioning procedure and a parameter list.
SV660F Series Servo Drive Communication Guide	19011670	Presents functions and parameters of the servo drive, including Profinet communication configuration, parameter description, and communication application cases.
SV660F Series Servo Drive Function Guide	19011669	Presents functions and parameters, including function overview, basic servo functions, adjustment and parameter list.
SV660F Series Servo Drive installation Guide	19012103	Presents installation of the servo drive, including installation steps, mechanical installation, and electrical installation.
SV660F Series Servo Drive Troubleshooting Guide	19012104	Introduces faults and fault levels, the troubleshooting process, warning codes and fault codes.
SV660F Series Servo Drive Maintenance Guide	19012105	Provides instructions on maintenance and repair of the equipment.

Name	Data Code	Description
SV660F Series Servo Drive Safety Guide	19012110	Presents the safety function and related certifications and standards, wiring, commissioning process, troubleshooting, and functions.
SV660F Series Servo Drive Manual Package	PS00005951	Provides information on selection, installation, commissioning, function, troubleshooting and parameters of the equipment.

Revision History

Date of Revision	Version	Revision
2023-01	A02	Added section Service and Support.
2022-12	A01	• Added warranty information in the preface. • Changed the MS1-Z motor to MS1-R motor. • Modified the name of the ferrite clamp. • Modified the selection table of support parts.
2022-07	A00	First release

How to Obtain

This guide is not delivered with the product. You can obtain the PDF version by visiting:

- Do keyword search at *http://www.inovance.com*.
- Scan the QR code on the equipment to acquire more.

Warranty

Inovance provides warranty service within the warranty period (as specified in your order) for any fault or damage that is not caused by improper operation of the user. You will be charged for any repair work after the warranty period expires.

Within the warranty period,maintenance fee will be charged for the following damage:

- Damage caused by operations not following the instructions in the user guide
- Damage caused by fire, flood, or abnormal voltage
- Damage caused by unintended use of the product
- Damage caused by use beyond the specified scope of application of the product
- Damage or secondary damage caused by force majeure (natural disaster, earthquake, and lightning strike)

The maintenance fee is charged according to the latest Price List of Inovance. If otherwise agreed upon, the terms and conditions in the agreement shall prevail.

For details, see the Product Warranty Card.

Table of Contents

Preface 1
1 Selection Table 6
1.1 Selection 6
1.2 Models of MS1-R Series Motors and MS1-Z Series Motors 7
2 SV660F Series 11
2.1 Product Information 11
2.1.1 Nameplate and Model Number 11
2.1.2 Description of Drive Models 12
2.1.3 Components 13
2.1.3.1 Servo Drives in Size A (0.2 kW to 0.4 kW) 13
2.1.3.2 Servo Drives in Size B (0.75 kW) 14
2.1.3.3 Servo Drives in Size C and Size D (Rated Power: 1.0 kW to 3.0 kW) 16
2.1.3.4 Servo Drives in Size E (Rated Power: 5.0 kW to 7.5 kW) 19
2.1.4 Product Dimensions 20
2.2 Motor Specifications 21
2.2.1 Electrical Specifications 21
2.2.2 Technical Specifications 24
2.2.3 Profinet Communication Technical Specifications 25
2.2.4 Dynamic Brake Characteristic Curve 26
2.2.5 Load Moment of Inertia 27
3 MS1-R Series Motor 28
3.1 Product Information 28
3.1.1 Model and Nameplate 28
3.1.2 Components 29
3.1.3 Motor Models 30
3.2 Motor Specifications 30
3.2.1 Mechanical Characteristics 30
3.2.2 Overload Characteristics 32
3.2.3 Derating Characteristics 34
3.2.4 Temperature Curve of the Oil Seal 35
3.3 Selection Instructions 35
3.4 Motors with Low Inertia and Small Capacity (MS1H1) 36
3.4.1 MS1H1-05B30CB-A33*Z 36
3.4.2 MS1H1-10B30CB-A33*Z 37

3.4.3 MS1H1-20B30CB-A33*R. . . . 39
3.4.4 MS1H1-40B30CB-A33*R. . . . 40
3.4.5 MS1H1-55B30CB-A331R 41
3.4.6 MS1H1-75B30CB-A33*R. . . . 42
3.4.7 MS1H1-10C30CB-A33*R. . . . 43
3.5 Motors with Low Inertia and Medium Capacity (MS1H2) 44
3.5.1 MS1H2-10C30CB-A33*R. . . . 44
3.5.2 MS1H2-10C30CD-A33*R 45
3.5.3 MS1H2-15C30CB-A33*R. . . . 46
3.5.4 MS1H2-15C30CD-A33*R 47
3.5.5 MS1H2-20C30CB-A33*R. . . . 48
3.5.6 MS1H2-20C30CD-A33*R 49
3.5.7 MS1H2-25C30CB-A33*R. . . . 50
3.5.8 MS1H2-25C30CD-A33*R 51
3.5.9 MS1H2-30C30CB-A33*R. . . . 52
3.5.10 MS1H2-30C30CD-A33*R 53
3.5.11 MS1H2-40C30CB-A33*R 54
3.5.12 MS1H2-40C30CD-A33*R 55
3.5.13 MS1H2-50C30CB-A33*R 56
3.5.14 MS1H2-50C30CD-A33*R 57
3.6 Motors with Medium Inertia and Medium Capacity (MS1H3) 58
3.6.1 MS1H3-85B15CB-A33*R. . . . 58
3.6.2 MS1H3-85B15CD-A33*R 59
3.6.3 MS1H3-13C15CB-A33*R. . . . 60
3.6.4 MS1H3-13C15CD-A33*R 61
3.6.5 MS1H3-18C15CB-A33*R. . . . 62
3.6.6 MS1H3-18C15CD-A33*R 63
3.6.7 MS1H3-29C15CB-A33*R. . . . 64
3.6.8 MS1H3-29C15CD-A33*R 65
3.6.9 MS1H3-44C15CB-A33*R. . . . 66
3.6.10 MS1H3-44C15CD-A33*R 67
3.6.11 MS1H3-55C15CD-A33*R 68
3.6.12 MS1H3-75C15CD-A33*R 69
3.7 Motors with Medium Inertia and Small Capacity (MS1H4) 70
3.7.1 MS1H4-10B30CB-A33*Z. . . . 70
3.7.2 MS1H4-20B30CB-A33*R. . . . 71
3.7.3 MS1H4-40B30CB-A33*R. . . . 72
3.7.4 MS1H4-55B30CB-A331R 73

3.7.5 MS1H4-75B30CB-A33*R. 74
3.7.6 MS1H4-10C30CB-A33*R. 75
4 Optional parts. 76
4.1 List of Optional Parts. 76
4.2 Cables 76
4.2.1 Model Description 76
4.2.2 Cable Type 77
4.2.3 Cable Selection. 79
4.3 Peripheral Electrical Components 83
4.3.1 Breaker. 83
4.3.2 Fuse 83
4.3.3 Electromagnetic Contactor. 84
4.3.4 AC Input Reactor 85
4.3.5 AC Input Reactor 86
4.3.6 EMC Filter 87
4.3.7 Magnetic Ring and Magnetic Buckle 89
4.4 Absolute Encoder Batteries 91
5 Service and Support 93

1 Selection Table

1.1 Selection

Servo motor				Servo drive SV660****I			
Motor without brake	Motor with brake	Flange Size	Capacity (kW)	Voltage Class	Size	Recommended Drive Model	No.
Ratings of MS1H1 (n_N=3000rpm, n_{max} =6000rpm) series motors							
MS1H1-05B30CB-A330Z	MS1H1-05B30CB-A332Z	40	0.05	Single-phase 220 V	A	S1R6	00002
MS1H1-10B30CB-A330Z	MS1H1-10B30CB-A332Z	40	0.1				
MS1H1-20B30CB-A331R	MS1H1-20B30CB-A334R	60	0.2				
MS1H1-40B30CB- A331R	MS1H1-40B30CB- A334R	60	0.4	Single-phase 220 V		S2R8	00003
MS1H1-55B30CB- A331R	-	80	0.55	Single-phase 220 V	B	S5R5	00005
MS1H1-75B30CB- A331R	MS1H1-75B30CB- A334R	80	0.75	Single-phase 220 V		S5R5	00005
MS1H1-10C30CB- A331R	MS1H1-10C30CB- A334R	80	1.0	Single-phase/Three-phase 220 V	C	S7R6	00006
Ratings of MS1H2 (n_N=3000rpm, n_{max} =6000rpm/5000rpm) series motors							
MS1H2-10C30CB-A331R	MS1H2-10C30CB-A334R	100	1.0	Single-phase/Three-phase 220 V	C	S7R6	00006
MS1H2-10C30CD-A331R	MS1H2-10C30CD-A334R	100	1.0	Three-phase 380 V		T3R5	10001
MS1H2-15C30CB-A331R	MS1H2-15C30CB-A334R	100	1.5	Single-phase/Three-phase 220 V	D	S012	00007
MS1H2-15C30CD-A331R	MS1H2-15C30CD-A334R	100	1.5	Three-phase 380 V	C	T5R4	10002
MS1H2-20C30CB-A331R	MS1H2-20C30CB-A334R	100	2.0	Single-phase/Three-phase 220 V	D	S012	00007
MS1H2-20C30CD-A331R	MS1H2-20C30CD-A334R	100	2.0	Three-phase 380 V	D	T8R4	10003
MS1H2-25C30CD-A331R	MS1H2-25C30CD-A334R	100	2.5	Three-phase 380 V	D	T8R4	10003
MS1H2-30C30CD-A331R	MS1H2-30C30CD-A334R	130	3.0	Three-phase 380 V	D	T012	10004
MS1H2-40C30CD-A331R	MS1H2-40C30CD-A334R	130	4.0	Three-phase 380 V	E	T017	10005
MS1H2-50C30CD-A331R	MS1H2-50C30CD-A334R	130	5.0	Three-phase 380 V		T021	10006
Ratings of MS1H3 (n_N=1500rpm, n_{max} =3000rpm) series motors							
MS1H3-85B15CB-A331R	MS1H3-85B15CB-A334R	130	0.85	Single-phase/Three-phase 220 V	C	S7R6	00006
MS1H3-85B15CD-A331R	MS1H3-85B15CD-A334R	130	0.85	Three-phase 380 V		T3R5	10001
MS1H3-13C15CB-A331R	MS1H3-13C15CB-A334R	130	1.3	Single-phase/Three-phase 220 V	D	S012	00007
MS1H3-13C15CD-A331R	MS1H3-13C15CD-A334R	130	1.3	Three-phase 380 V	C	T5R4	10002
MS1H3-18C15CD-A331R	MS1H3-18C15CD-A334R	130	1.8	Three-phase 380 V	D	T8R4	10003
MS1H3-29C15CD-A331R	MS1H3-29C15CD-A334R	180	2.9	Three-phase 380 V	D	T012	10004

Servo motor				Servo drive SV660****I			
Motor without brake	Motor with brake	Flange Size	Capacity (kW)	Voltage Class	Size	Recommended Drive Model	No.
MS1H3-44C15CD-A331R	MS1H3-44C15CD-A334R	180	4.4	Three-phase 380 V	E	T017	10005
MS1H3-55C15CD-A331R	MS1H3-55C15CD-A334R	180	5.5	Three-phase 380 V		T021	10006
MS1H3-75C15CD-A331R	MS1H3-75C15CD-A334R	180	7.5	Three-phase 380 V		T026	10007
MS1H4 (n_N=3000rpm, n_{max} =6000rpm) ratings							
MS1H4-10B30CB-A330Z	MS1H4-10B30CB-A332Z	40	0.1	Single-phase 220 V	A	S1R6	00002
MS1H4-20B30CB-A331R	MS1H4-20B30CB-A334R	60	0.2				
MS1H4-40B30CB-A331R	MS1H4-40B30CB-A334R	60	0.4	Single-phase 220 V		S2R8	00003
MS1H4-55B30CB-A331R	-	80	0.55	Single-phase 220 V	B	S5R5	00005
MS1H4-75B30CB-A331R	MS1H4-75B30CB-A334R	80	0.75	Single-phase 220 V		S5R5	00005
MS1H4-10C30CB-A331R	MS1H4-10C30CB-A334R	80	1.0	Single-phase/Three-phase 220 V	C	S7R6	00006

Note

Servo motors match different series of servo drives, and the maximum speed and maximum torque output of the motor vary slightly. See the servo drive selection guide for details.

1.2 Models of MS1-R Series Motors and MS1-Z Series Motors

Flange Size	Models without brake		Models with Brake	
	MS1-Z series motor model	MS1-R series motor model	MS1-Z series motor model	MS1-R series motor model
60	MS1H1-20B30CB-A331Z	MS1H4-20B30CB-A331R	MS1H1-20B30CB-A334Z	MS1H4-20B30CB-A334R
	MS1H1-40B30CB-A331Z	MS1H4-40B30CB-A331R	MS1H1-40B30CB-A334Z	MS1H4-40B30CB-A334R
	MS1H4-40B30CB-A331Z	MS1H4-40B30CB-A331R	MS1H4-40B30CB-A334Z	MS1H4-40B30CB-A334R
	MS1H1-20B30CB-A331Z-S	MS1H4-20B30CB-A331R-S	MS1H1-20B30CB-A334Z-S	MS1H4-20B30CB-A334R-S
	MS1H1-40B30CB-A331Z-S	MS1H4-40B30CB-A331R-S	MS1H1-40B30CB-A334Z-S	MS1H4-40B30CB-A334R-S
	MS1H4-40B30CB-A331Z-S	MS1H4-40B30CB-A331R-S	MS1H4-40B30CB-A334Z-S	MS1H4-40B30CB-A334R-S
	MS1H1-20B30CB-T331Z	MS1H4-20B30CB-T331R	MS1H1-20B30CB-T334Z	MS1H4-20B30CB-T334R
	MS1H1-40B30CB-T331Z	MS1H4-40B30CB-T331R	MS1H1-40B30CB-T334Z	MS1H4-40B30CB-T334R
	MS1H4-40B30CB-T331Z	MS1H4-40B30CB-T331R	MS1H4-40B30CB-T334Z	MS1H4-40B30CB-T334R
	MS1H1-20B30CB-T331Z X6	MS1H4-20B30CB-T331R	MS1H1-20B30CB-T334Z X6	MS1H4-20B30CB-T334R
	MS1H1-40B30CB-T331Z X6	MS1H4-40B30CB-T331R	MS1H1-40B30CB-T334Z X6	MS1H4-40B30CB-T334R
	MS1H4-40B30CB-T331Z X6	MS1H4-40B30CB-T331R	MS1H4-40B30CB-T334Z X6	MS1H4-40B30CB-T334R
	-	MS1H4-20B30CB-T331R-S	-	MS1H4-20B30CB-T334R-S
	-	MS1H4-40B30CB-T331R-S	-	MS1H4-40B30CB-T334R-S

Note

- The R version of the H4 inertia model is used to replace the Z version of the H1 and H4 inertia models.
- The H1 model, ultra-small inertia type motor added to the flange size 60 and 80 of R version, is mainly used for fast point-to-point motion control applications.

Flange Size	Models without brake		Models with Brake	
	MS1-Z series motor model	MS1-R series motor model	MS1-Z series motor model	MS1-R series motor model
80	MS1H1-55B30CB-A331Z	MS1H4-55B30CB-A331R	MS1H1-75B30CB-A334Z	MS1H4-75B30CB-A334R
	MS1H1-75B30CB-A331Z	MS1H4-75B30CB-A331R	MS1H4-75B30CB-A334Z	MS1H4-75B30CB-A334R
	MS1H4-75B30CB-A331Z	MS1H4-75B30CB-A331R	MS1H1-75B30CB-A334Z-S	MS1H4-75B30CB-A334R-S
	MS1H1-10C30CB-A331Z	MS1H4-10C30CB-A331R	MS1H4-75B30CB-A334Z-S	MS1H4-75B30CB-A334R-S
	MS1H1-55B30CB-A331Z-S	MS1H4-55B30CB-A331R-S	MS1H1-75B30CB-T334Z	MS1H4-75B30CB-T334R
	MS1H1-75B30CB-A331Z-S	MS1H4-75B30CB-A331R-S	MS1H4-75B30CB-T334Z	MS1H4-75B30CB-T334R
	MS1H4-75B30CB-A331Z-S	MS1H4-75B30CB-A331R-S	MS1H1-75B30CB-T334Z X6	MS1H4-75B30CB-T334R
	MS1H1-10C30CB-A331Z-S	MS1H4-10C30CB-A331R-S	MS1H4-75B30CB-T334Z X6	MS1H4-75B30CB-T334R
	MS1H1-55B30CB-T331Z	MS1H4-55B30CB-T331R	-	MS1H4-10C30CB-A334R
	MS1H1-75B30CB-T331Z	MS1H4-75B30CB-T331R	-	MS1H4-10C30CB-A334R-S
	MS1H4-75B30CB-T331Z	MS1H4-75B30CB-T331R	-	MS1H4-10C30CB-T334R
	MS1H1-10C30CB-T331Z	MS1H4-10C30CB-T331R	-	MS1H4-75B30CB-T334R-S
	MS1H1-55B30CB-T331Z X6	MS1H4-55B30CB-T331R	-	MS1H4-10C30CB-T334R-S
	MS1H1-75B30CB-T331Z X6	MS1H4-75B30CB-T331R	-	-
	MS1H4-75B30CB-T331Z X6	MS1H4-75B30CB-T331R	-	-
	MS1H1-10C30CB-T331Z X6	MS1H4-10C30CB-T331R	-	-
	-	MS1H4-55B30CB-T331R-S	-	-
	-	MS1H4-75B30CB-T331R-S	-	-
	-	MS1H4-10C30CB-T331R-S	-	-

Note

- The R version of the H4 inertia model is used to replace the Z version of the H1 and H4 inertia models.
- The H1 model, ultra-small inertia type motor added to the flange size 60 and 80 of R version, is mainly used for fast point-to-point motion control applications.

Flange Size	Models without brake		Models with Brake	
	MS1-Z series motor model	MS1-R series motor model	MS1-Z series motor model	MS1-R series motor model
100	MS1H2-10C30CB-A331Z	MS1H2-10C30CB-A331R	MS1H2-10C30CB-A334Z	MS1H2-10C30CB-A334R
	MS1H2-10C30CD-A331Z	MS1H2-10C30CD-A331R	MS1H2-10C30CD-A334Z	MS1H2-10C30CD-A334R
	MS1H2-15C30CB-A331Z	MS1H2-15C30CB-A331R	MS1H2-15C30CD-A334Z	MS1H2-15C30CD-A334R
	MS1H2-15C30CD-A331Z	MS1H2-15C30CD-A331R	MS1H2-15C30CB-A334Z	MS1H2-15C30CB-A334R
	MS1H2-20C30CD-A331Z	MS1H2-20C30CD-A331R	MS1H2-20C30CD-A334Z-S4	MS1H2-20C30CD-A334R
	MS1H2-25C30CD-A331Z	MS1H2-25C30CD-A331R	MS1H2-25C30CD-A334Z-S4	MS1H2-25C30CD-A334R
	MS1H2-10C30CB-T331Z	MS1H2-10C30CB-T331R	MS1H2-10C30CB-T334Z	MS1H2-10C30CB-T334R
	MS1H2-10C30CD-T331Z	MS1H2-10C30CD-T331R	MS1H2-10C30CD-T334Z	MS1H2-10C30CD-T334R
	MS1H2-15C30CB-T331Z	MS1H2-15C30CB-T331R	MS1H2-15C30CD-T334Z	MS1H2-15C30CD-T334R
	MS1H2-15C30CD-T331Z	MS1H2-15C30CD-T331R	MS1H2-15C30CB-T334Z	MS1H2-15C30CB-T334R
	MS1H2-20C30CD-T331Z	MS1H2-20C30CD-T331R	MS1H2-20C30CD-T334Z-S4	MS1H2-20C30CD-T334R
	MS1H2-25C30CD-T331Z	MS1H2-25C30CD-T331R	MS1H2-25C30CD-T334Z-S4	MS1H2-25C30CD-T334R
130	MS1H2-30C30CD-A331Z	MS1H2-30C30CD-A331R	MS1H2-30C30CD-A334Z-S4	MS1H2-30C30CD-A334R
	MS1H2-40C30CD-A331Z	MS1H2-40C30CD-A331R	MS1H2-40C30CD-A334Z-S4	MS1H2-40C30CD-A334R
	MS1H2-50C30CD-A331Z	MS1H2-50C30CD-A331R	MS1H2-50C30CD-A334Z-S4	MS1H2-50C30CD-A334R
	MS1H2-30C30CD-T331Z	MS1H2-30C30CD-T331R	MS1H2-30C30CD-T334Z-S4	MS1H2-30C30CD-T334R
	MS1H2-40C30CD-T331Z	MS1H2-40C30CD-T331R	MS1H2-40C30CD-T334Z-S4	MS1H2-40C30CD-T334R
	MS1H2-50C30CD-T331Z	MS1H2-50C30CD-T331R	MS1H2-50C30CD-T334Z-S4	MS1H2-50C30CD-T334R
130	MS1H3-85B15CB-A331Z	MS1H3-85B15CB-A331R	MS1H3-85B15CB-A334Z	MS1H3-85B15CB-A334R
	MS1H3-85B15CD-A331Z	MS1H3-85B15CD-A331R	MS1H3-85B15CD-A334Z	MS1H3-85B15CD-A334R
	MS1H3-13C15CB-A331Z	MS1H3-13C15CB-A331R	MS1H3-13C15CB-A334Z	MS1H3-13C15CB-A334R
	MS1H3-13C15CD-A331Z	MS1H3-13C15CD-A331R	MS1H3-13C15CD-A334Z	MS1H3-13C15CD-A334R
	MS1H3-18C15CD-A331Z	MS1H3-18C15CD-A331R	MS1H3-18C15CD-A334Z	MS1H3-18C15CD-A334R
	MS1H3-85B15CB-T331Z X6	MS1H3-85B15CB-T331R	MS1H3-85B15CB-T334Z X6	MS1H3-85B15CB-T334R
	MS1H3-85B15CD-T331Z X6	MS1H3-85B15CD-T331R	MS1H3-85B15CD-T334Z X6	MS1H3-85B15CD-T334R
	MS1H3-13C15CB-T331Z X6	MS1H3-13C15CB-T331R	MS1H3-13C15CB-T334Z X6	MS1H3-13C15CB-T334R
	MS1H3-13C15CD-T331Z X6	MS1H3-13C15CD-T331R	MS1H3-13C15CD-T331Z X6	MS1H3-13C15CD-T331R
	MS1H3-18C15CD-T331Z X6	MS1H3-18C15CD-T331R	MS1H3-13C15CD-T334Z X6	MS1H3-13C15CD-T334R
	MS1H3-85B15CB-T331Z	MS1H3-85B15CB-T331R	MS1H3-18C15CD-T334Z X6	MS1H3-18C15CD-T334R
	MS1H3-85B15CD-T331Z	MS1H3-85B15CD-T331R	MS1H3-85B15CB-T334Z	MS1H3-85B15CB-T334R
	MS1H3-85B15CD-T334Z	MS1H3-85B15CD-T334R	MS1H3-85B15CD-T334Z	MS1H3-85B15CD-T334R
	MS1H3-13C15CB-T331Z	MS1H3-13C15CB-T331R	MS1H3-13C15CB-T334Z	MS1H3-13C15CB-T334R
	MS1H3-13C15CD-T331Z	MS1H3-13C15CD-T331R	MS1H3-13C15CD-T334Z	MS1H3-13C15CD-T334R
	MS1H3-18C15CD-T331Z	MS1H3-18C15CD-T331R	MS1H3-18C15CD-T334Z	MS1H3-18C15CD-T334R

Selection Table

Flange Size	Models without brake		Models with Brake	
	MS1-Z series motor model	MS1-R series motor model	MS1-Z series motor model	MS1-R series motor model
180	MS1H3-29C15CD-A331Z	MS1H3-29C15CD-A331R	MS1H3-29C15CD-A334Z	MS1H3-29C15CD-A334R
	MS1H3-44C15CD-A331Z	MS1H3-44C15CD-A331R	MS1H3-44C15CD-A334Z	MS1H3-44C15CD-A334R
	MS1H3-55C15CD-A331Z	MS1H3-55C15CD-A331R	MS1H3-55C15CD-A334Z	MS1H3-55C15CD-A334R
	MS1H3-75C15CD-A331Z	MS1H3-75C15CD-A331R	MS1H3-75C15CD-A334Z	MS1H3-75C15CD-A334R
	MS1H3-29C15CD-T331Z	MS1H3-29C15CD-T331R	MS1H3-29C15CD-T334Z	MS1H3-29C15CD-T334R
	MS1H3-44C15CD-T331Z	MS1H3-44C15CD-T331R	MS1H3-44C15CD-T334Z	MS1H3-44C15CD-T334R
	MS1H3-55C15CD-T331Z	MS1H3-55C15CD-T331R	MS1H3-55C15CD-T334Z	MS1H3-55C15CD-T334R
	MS1H3-75C15CD-T331Z	MS1H3-75C15CD-T331R	MS1H3-75C15CD-T334Z	MS1H3-75C15CD-T334R

2 SV660F Series

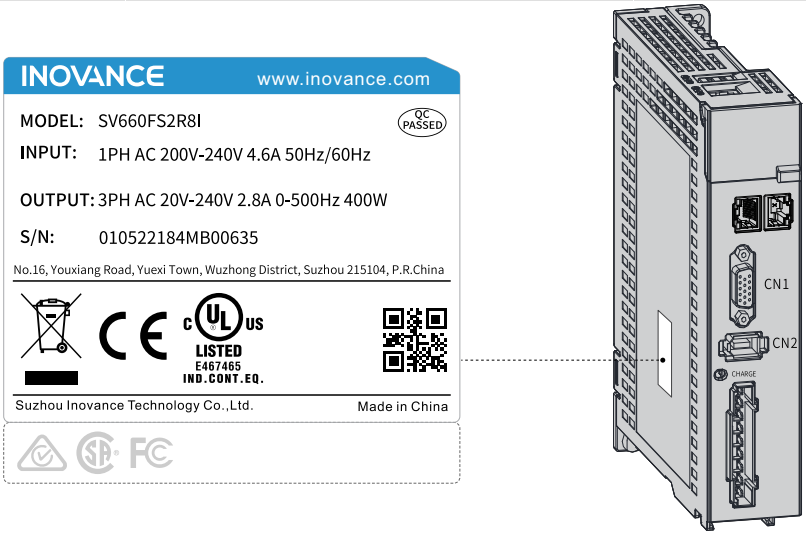
2.1 Product Information

2.1.1 Nameplate and Model Number

Nameplate and Model Number

SV660 F S 2R8 I - FH
① ② ③ ④ ⑤ ⑥

1 **Product Series** SV660: SV660 series servo drive	4 **Rated output current**		5 **Installation Mode** I: Base plate-mounted
2 **Product type** F: Profinet	S: 220 V	1R6: 1.6 A 2R8: 2.8 A 5R5: 5.5 A 7R6: 7.6 A 012: 11.6 A	6 **Non-standard features** Blank: standard FH: High protection FS: STO
3 **Voltage class** S: 220 V T: 380 V	T: 380 V	3R5: 3.5 A 5R4: 5.4 A 8R4: 8.4 A 012: 11.9 A 017: 16.5 A 021: 20.8 A 026: 25.7 A	



Encryption of the production serial number

01050202 4 H 7 00001
① ② ③ ④ ⑤

1 **Internal code** Material code	3 **Year** 9: 2009 A: 2010 ... N: 2021 ... Note: I/L/O/Q is not used.	5 **Lot number** 00001: 1st in current month 00002: 2nd in current month 00003: 3rd in current month ... Range: 00001 to 99999
2 **Manufacturer code** 4: Suzhou Inovance	4 **Month** 1: January 2: February ... A: October B: November C: December	

Example: The S/N 010502024H700001 indicates the drive is manufactured in July, 2017.

2.1.2 Description of Drive Models

Series	Control mode	Communication protocol	Connecting terminal
SV660F	AC1 mode	PROFINET RS232	PROFINET RS232 STO
	AC3 mode		
	AC4 mode		

2.1.3 Components

2.1.3.1 Servo Drives in Size A (0.2 kW to 0.4 kW)

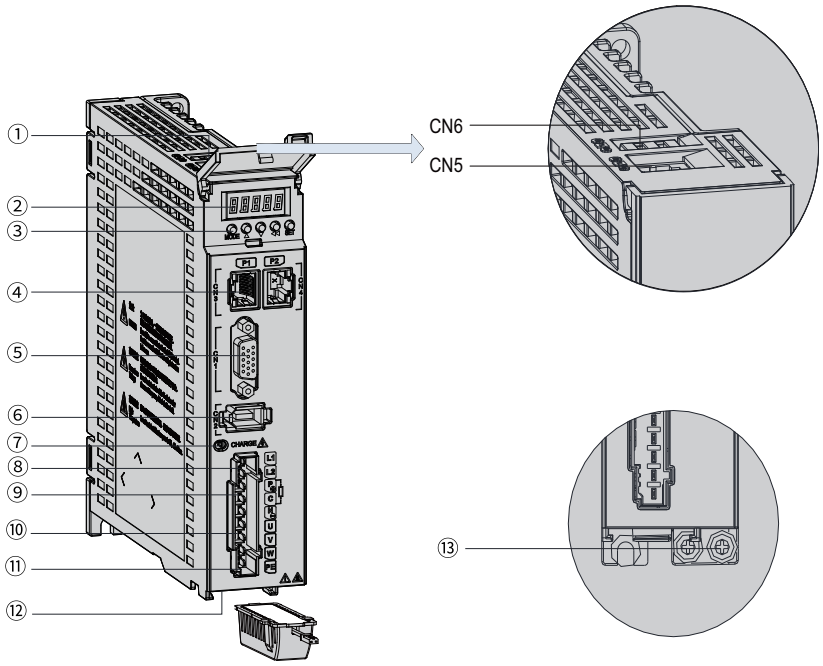


Figure 2-1 Components (SV660FS1R6I, SV660FS2R8I)

Table 2–1 Description of components (SV660FS1R6I, SV660FS2R8I)

No.	Name	Description
1	CN6 (STO safety function terminal)	Connected to external functional safety signal for functional safety purpose.
	CN5 (communication terminals)	Connected to RS-232 communication instruction device.
2	5-digit LED display	The 5-digit 8-segment LED display is used to show servo system’s running state and parameter setting.
3	Keys	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit. ▽: Used to decrease the value of the blinking bit. ◁: Used to shift the blinking bit leftwards. (Hold down: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
4	CN3, CN4 (Profinet communication terminal)	CN3(P1) is connected to the host controller, and CN4(P2) is connected to a slave.
5	CN1 (control terminal)	Used by reference input signals and other I/O signals.
6	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
7	CHARGE (bus voltage indicator)	Indicates the electric charge is present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shock, do not touch the power terminals when this indicator lights up.

No.	Name	Description
8	L1, L2 (power input terminals)	See the nameplate for the rated voltage class.
9	P⊕, N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives.
	P⊕, C (terminals for connecting external regenerative resistor)	If an external regenerative resistor is needed, connect it between terminals P⊕ and C.
10	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
11	Motor grounding terminal	Connected to the grounding terminal of the motor for grounding purpose.
12	Battery location	Used to hold the battery box of the absolute encoder.
13	Power supply grounding terminal	Connected to the grounding terminal of the power supply for grounding purpose.

Note

- The built-in regenerative resistor or jumper bar is not available in models S1R6 and S2R8. If an external regenerative resistor is needed for these models, connect it between terminals P⊕ and C.
- The CN6 STO safety function terminal is only suitable for non-standard models (-FS).

2.1.3.2 Servo Drives in Size B (0.75 kW)

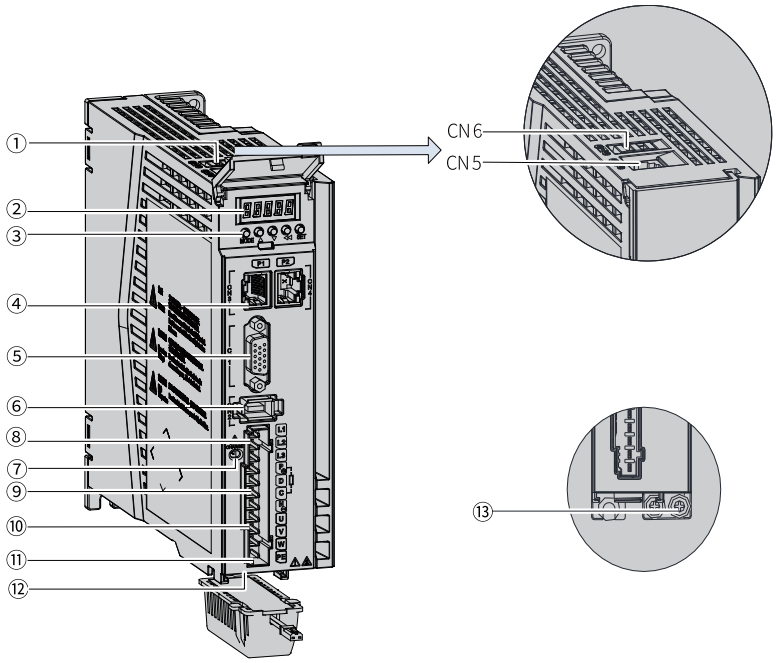


Figure 2-2 Components (SV660FS5R5I)

Table 2–2 Description of components (SV660FS5R5I)

No.	Name	Description
1	CN6 (STO safety function terminal)	Connected to external functional safety signal for functional safety purpose.
	CN5 (communication terminals)	Connected to RS-232 communication instruction device.
2	5-digit LED display	The 5-digit 8-segment LED display is used to show servo system’s running state and parameter setting.
3	Keys	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit. ▽: Used to decrease the value of the blinking bit. ◁: Used to shift the blinking bit leftwards. (Hold down: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
4	CN3, CN4 (Profinet communication terminal)	CN3(P1) is connected to the host controller, and CN4(P2) is connected to a slave.
5	CN1 (control terminal)	Used by reference input signals and other I/O signals.
6	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
7	CHARGE (bus voltage indicator)	Indicates the electric charge is present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shock, do not touch the power terminals when this indicator lights up.
8	L1, L2, L3 (power input terminals)	See the nameplate for the rated voltage class. Note: S5R5 (0.75 kW) models support single-phase 220 V input only, with a 220 V power supply connected between terminals L1 and L2.
9	P⊕, N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives.
	P⊕, D, C (terminals for connecting external regenerative resistor)	Remove the jumper bar between terminals P⊕ and D before connecting an external regenerative resistor between terminals P⊕ and C.
10	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
11	Motor grounding terminal	Connected to the grounding terminal of the motor for grounding purpose.
12	Battery location	Used to hold the battery box of the absolute encoder.
13	Power supply grounding terminal	Connected to the grounding terminal of the power supply for grounding purpose.

Note

The CN6 STO safety function terminal is only suitable for non-standard models (-FS).

2.1.3.3 Servo Drives in Size C and Size D (Rated Power: 1.0 kW to 3.0 kW)

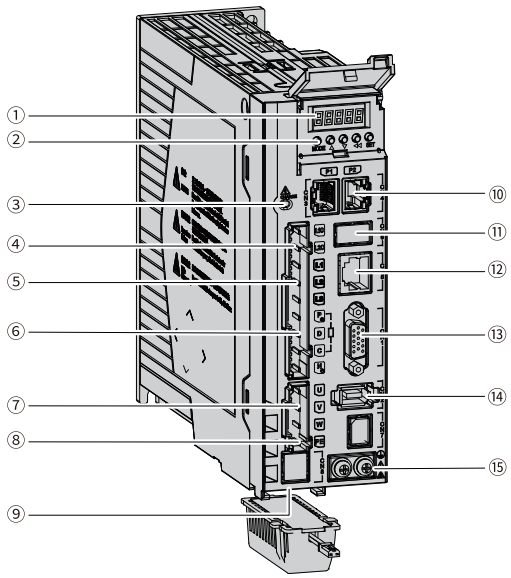


Figure 2-3 Components (SIZE C:SV660FS7R6I/SZIE D:SV660FS012I)

Table 2–3 Description of Components (SIZE C:SV660FS7R6I/SZIE D:SV660FS012I)

No.	Name	Description
1	5-digit LED display	The 5-digit 8-segment LED display is used to show servo system’s running state and parameter setting.
2	Keys	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit. ▽: Used to decrease the value of the blinking bit. ◁: Used to shift the blinking bit leftwards. (Hold down: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
3	CHARGE (bus voltage indicator)	Indicates the electric charge is present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shock, do not touch the power terminals when this indicator lights up.
4	L1C, L2C (control circuit power input terminals)	See the nameplate for the rated voltage class.
5	L1, L2, L3 (main circuit power input terminals)	Used as the power input terminals for a three-phase 220 V servo drive. See the nameplate for the rated voltage class.
6	P⊕, D, C (terminals for connecting external regenerative resistor)	Remove the jumper bar between terminals P⊕ and D before connecting an external regenerative resistor between terminals P⊕ and C.
	P⊕, N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives.
7	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
8	Motor grounding terminal	Connected to the grounding terminal of the motor for grounding purpose.

No.	Name	Description
9	Battery location	Used to hold the battery box of the absolute encoder.
10	CN3, CN4 (Profinet communication terminal)	CN3(P1) is connected to the host controller, and CN4(P2) is connected to a slave.
11	CN6 (STO safety function terminal)	Connected to external functional safety signal for functional safety purpose.
12	CN5 (communication terminals)	Connected to RS-232 communication instruction device.
13	CN1 (control terminal)	Used by reference input signals and other I/O signals.
14	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
15	Servo drive grounding terminal	Connected to the grounding terminal of the power supply for grounding purpose

Note

- The main circuits of models S7R6 and S012 can be connected to a single-phase or a three-phase power supply, depending on which one is available on site. No derating is required when a single-phase power supply is used for models S7R6 and S012.
- The CN6 STO safety function terminal is only suitable for non-standard models (-FS).

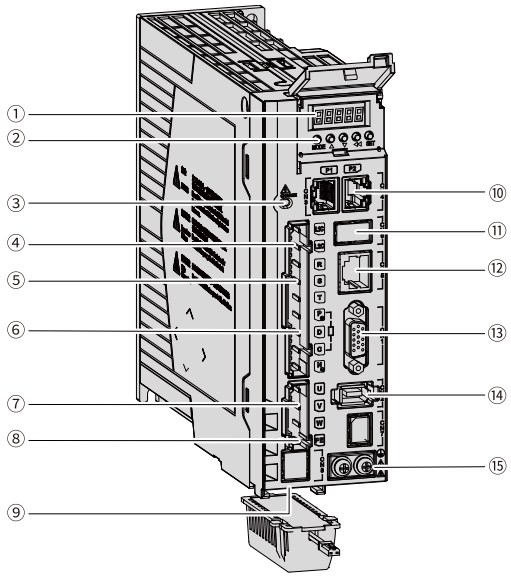


Figure 2-4 Components (SIZE C:SV660FT3R5I, SV660FT5R4I/SIZE D: SV660FT8R4I, SV660FT012I)

Table 2–4 Description of Components (SIZE C:SV660FT3R5I, SV660FT5R4I/SIZE D:SV660FT8R4I, SV660FT012I)

No.	Name	Description
1	5-digit LED display	The 5-digit 8-segment LED display is used to show servo system’s running state and parameter setting.
2	Keys	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit. ▽: Used to decrease the value of the blinking bit. ◁: Used to shift the blinking bit leftwards. (Hold down: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
3	CHARGE (bus voltage indicator)	Indicates the electric charge is present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shock, do not touch the power terminals when this indicator lights up.
4	L1C, L2C (control circuit power input terminals)	See the nameplate for the rated voltage class.
5	R, S, T (main circuit power input terminals)	See the nameplate for the rated voltage class.
6	P⊕, D, C (terminals for connecting external regenerative resistor)	Remove the jumper bar between terminals P⊕ and D before connecting an external regenerative resistor between terminals P⊕ and C.
	P⊕, N⊖ (servo bus terminals)	Used by the common DC bus for multiple servo drives.
7	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
8	Motor grounding terminal	Connected to the grounding terminal of the motor for grounding purpose.
9	Battery location	Used to hold the battery box of the absolute encoder.
10	CN3, CN4 (Profinet communication terminal)	CN3(P1) is connected to the host controller, and CN4(P2) is connected to a slave.
11	CN6 (STO safety function terminal)	Connected to external functional safety signal for functional safety purpose.
12	CN5 (communication terminals)	Connected to RS-232 communication instruction device.
13	CN1 (control terminal)	Used by reference input signals and other I/O signals.
14	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
15	Servo drive grounding terminal	Connected to the grounding terminal of the power supply for grounding purpose

Note

The CN6 STO safety function terminal is only suitable for non-standard models (-FS).

2.1.3.4 Servo Drives in Size E (Rated Power: 5.0 kW to 7.5 kW)

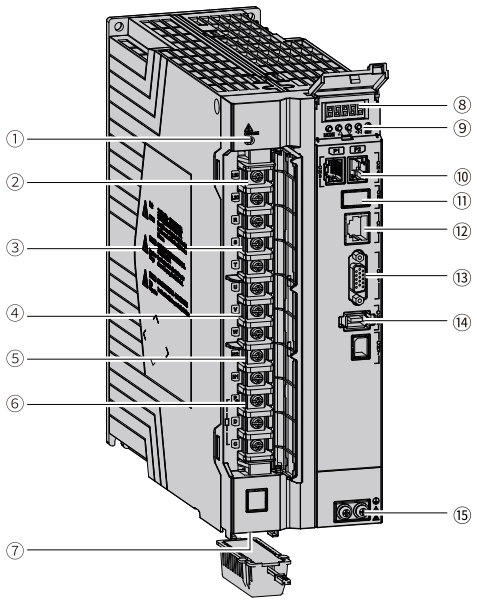


Figure 2-5 Components of servo drives in size E (SV660FT017I, SV660FT021I, SV660FT026I)

Table 2–5 Components (SV660FT017I, SV660FT021I, SV660FT026I)

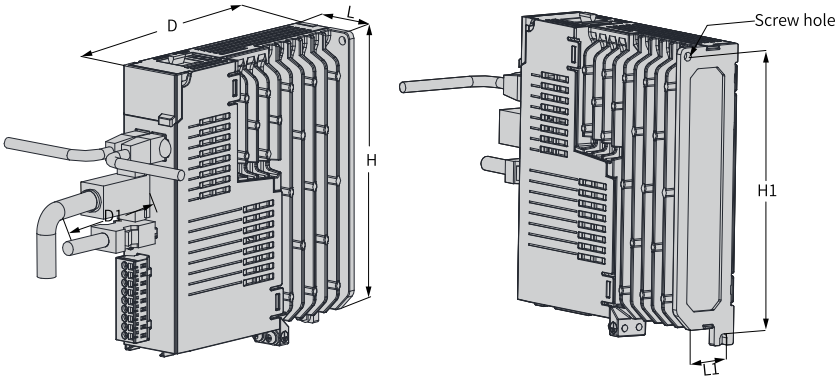
No.	Name	Description
1	CHARGE (bus voltage indicator)	Indicates the electric charge is present in the bus capacitor. When the indicator turns on, charges possibly still exist in the internal capacitor of the servo unit, even if the power supply of the main circuit is OFF. To prevent electric shock, do not touch the power terminals when this indicator lights up.
2	L1C, L2C (control circuit power input terminals)	See the nameplate for the rated voltage class.
3	R, S, T (main circuit power input terminals)	See the nameplate for the rated voltage class.
4	U, V, W (terminals for connecting the servo motor)	Connected to U, V, and W phases of the servo motor.
5	N2, N1 (terminals for connecting external reactor)	Terminals N1 and N2 are jumpered by default. To suppress harmonics in the power supply, remove the jumper between terminals N1 and N2 first and connect an external DC reactor between terminals N1 and N2.
6	P⊕, D, C (terminals for connecting external regenerative resistor)	Remove the jumper bar between terminals P⊕ and D before connecting an external regenerative resistor between terminals P⊕ and C.
7	Battery location	Used to hold the battery box of the absolute encoder.
8	5-digit LED display	The 5-digit 8-segment LED display is used to show servo system’ s running state and parameter setting.

No.	Name	Description
9	Keys	MODE: Used to switch parameters in sequence. △: Used to increase the value of the blinking bit. ▽: Used to decrease the value of the blinking bit. ◁: Used to shift the blinking bit leftwards. (Hold down: Turning to the next page when the displayed number exceeds five digits) SET: Used to save modifications and enter the next menu.
10	CN3, CN4 (Profinet communication terminal)	CN3(P1) is connected to the host controller, and CN4(P2) is connected to a slave.
11	CN6 (STO safety function terminal)	Connected to external functional safety signal for functional safety purpose.
12	CN5 (communication terminals)	Connected to RS-232 communication instruction device.
13	CN1 (control terminal)	Used by reference input signals and other I/O signals.
14	CN2 (terminal for connecting the encoder)	Connected to the motor encoder terminal.
15	Grounding terminal	Connected to the grounding terminals of the power supply and the motor.

Note

The CN6 STO safety function terminal is only suitable for non-standard models (-FS).

2.1.4 Product Dimensions



Size	L	H	D	L1	H1	D1	Screw Hole	Tightening Torque	Weight
	Unit: mm (in.)							Unit: N·m	Unit: kg (lb.)
A	40 (1.57)	170 (6.69)	150 (5.91)	28 (1.10)	161 (6.34)	75 (2.95)	2-M4	0.6–1.2	0.8 (1.76)
B	50 (1.97)	170 (6.69)	173 (6.81)	37 (1.46)	161 (6.34)	75 (2.95)	2-M4	0.6–1.2	1.0 (2.20)

Size	L	H	D	L1	H1	D1	Screw Hole	Tightening Torque	Weight
	Unit: mm (in.)							Unit: N·m	Unit: kg (lb.)
C	55±1 (2.17±0.04)	170 (6.69)	173±1 (6.81±0.04)	44 (1.73)	160 (6.30)	75 (2.95)	2-M4	0.6–1.2	1.3 (2.87)
D	80±1 (3.15±0.04)	170 (6.69)	183 (7.20)	71 (2.80)	160 (6.30)	75 (2.95)	3-M4	0.6–1.2	1.8 (3.97)
E	90 (3.54)	250 (9.84)	230 (9.06)	78 (3.07)	240.5 (9.47)	75 (2.95)	4-M4	0.6–1.2	3.6 (7.94)

2.2 Motor Specifications

2.2.1 Electrical Specifications

- Single-phase 220 V drive

Item		Size A		Size B	Size C	Size D
Servo Drive Model		S1R6	S2R8	S5R5	S7R6	S012
Drive Power (kW)		0.2	0.4	0.75	1	1.5
Max. applicable motor capacity (kW)		0.2	0.4	0.75	1	1.5
Power supply equipment capacity (kVA)		1.4	2.8	4.6	6.0	8.0
Continuous output current (Arms)		1.6	2.8	5.5	7.6	11.6
Max. output current (Arms)		5.8	10.1	16.9	23.0	32.0
Main circuit	Continuous input current (Arms)	2.3	4.0	7.9	9.6	12.8
	Main circuit power supply	Single-phase 200 VAC–240 VAC, -10% to +10%, 50 Hz/60 Hz				
	Energy Loss (W)[1]	10.21	23.8	38.2	47.32	69.84
Control circuit	Control circuit power supply	Powered up by the bus, sharing the same power supply and rectification part with the main circuit				
	Energy Loss (W)[1]	16				
Braking resistor	Resistance (Ω)	-	-	50	25	
	Resistor power (W)	-	-	50	80	
	Min resistance of external resistor (Ω)	40	45	40	20	15
	Max. braking energy absorbed by capacitor (J)	9.3	26.29	22.41	26.70	26.70
	Braking resistor	All models in the series support built-in and external braking resistors. But Size A does not come with a built-in braking resistor as standard				
Cooling method		Self-cooling		Air cooling		
Overvoltage class		III				

- Three-phase 220V drive

Item		Size C	Size D
Servo Drive Model		S7R6	S012
Drive Power (kW)		1	1.5
Max. applicable motor capacity (kW)		1	1.5
Power supply equipment capacity (kVA)		5.05	6.68
Continuous output current (Arms)		7.6	11.6
Max. output current (Arms)		23	32
Main circuit	Continuous input current (Arms)	5.1	8.0
	Main circuit power supply	3-phase 200 VAC–240 VAC, -10% to +10%, 50 Hz/60 Hz	
	Energy Loss (W)[1]	47.32	69.84
Control circuit	Control circuit power supply	Single-phase 200 VAC–240 VAC, -10% to +10%, 50 Hz/60 Hz	
	Energy Loss (W)[1]	16	
Braking resistor	Resistance (Ω)	25	
	Resistor power (W)	80	
	Min resistance of external resistor (Ω)	20	15
	Max. braking energy absorbed by capacitor (J)	26.70	26.70
	Braking resistor	Built-in and external resistor is supported	
Cooling mode		Air cooling	
Overvoltage class		III	

- Three-phase 380 V drive

Item		Size C		Size D		Size E		
Servo Drive Model		T3R5	T5R4	T8R4	T012	T017	T021	T026
Drive Power (kW)		1	1.5	2	3	5	6	7.5
Max. applicable motor capacity (kW)		1	1.5	2	3	5	6	7.5
Power supply equipment capacity (kVA)		6.05	9.08	10.23	15.15	22.25	25.0	31.25
Continuous output current (Arms)		3.5	5.4	8.4	11.9	16.5	20.8	25.7
Max. output current (Arms)		11	14	20	29.75	41.25	52.12	64.25
Main circuit	Continuous input current (Arms)	2.4	3.6	5.6	8.0	12.0	16.0	21.0
	Main circuit power supply	3-phase 380 VAC–440 VAC, -10% to +10%, 50 Hz/60 Hz						
	Energy Loss (W)[1]	39.5	63.25	94.82	135.47	187.62	228.28	258.63
Control circuit	Control circuit power supply	Single-phase 380 VAC–440 VAC, -10% to +10%, 50 Hz/60 Hz						
	Energy Loss (W)[1]	16						

Item		Size C		Size D		Size E		
Braking resistor	Resistance (Ω)	100	100	50	50	35	35	35
	Resistor power (W)	80	80	80	80	100	100	100
	Min resistance of external resistor (Ω)	80	60	45	40	35	25	25
	Max. braking energy absorbed by capacitor (J)	34.28	34.28	50.41	50.41	82.67	100.82	100.82
	Braking resistor	Built-in and external resistor is supported						
Cooling mode		Air cooling						
Overvoltage class		III						

Note

- [1] Main circuit energy loss refers to the energy loss under rated output current of the servo drive.
- Select the external regenerative resistor according to actual operating conditions.

2.2.2 Technical Specifications

Item			Description
Basic Specifications	Control mode		IGBT PWM control, sine wave current drive mode 220 V, 380 V: Single-phase/Three-phase full bridge rectification
	Encoder feedback		23-bit multi-turn absolute encoder, which can be used as an incremental encoder in absence of the battery
	Working Condition	Operating/Storage temperature [1]	0°C to +55°C (If the ambient temperature exceeds 45°C, derate by 10% for every additional 5°C)/-20°C to +70°C
		Operating/Storage humidity	Below 90% RH (no condensation)
		Vibration resistance	4.9m/s^2
		Impact resistance	19.6 m/s^2
		IP rating	IP20 (excluding terminals (IP00))
		Pollution degree	PD2
		Altitude	Max. 2000m For altitudes not higher than 1000 m, derating is not required Derating is required for altitudes above 1000 m (derate 1% for every additional 100 m). For altitudes above 2000 m, contact Inovance.
Speed/Torque Control mode	Performance	Speed control range	1:6000 (Under the rated torque load, the servo drive keeps running as long as the lower limit of the speed control range is not exceeded.)
		Speed loop bandwidth	3kHz
		Torque control accuracy (repeatability)	±2%
		Soft startup time	0s to 65s (Acceleration and deceleration can be set separately.)
	Input Signal	Speed reference	Network-type instructions are from PROFINET communication Local mode and local multi-speed supported
		Torque reference	
Position control mode	Performance	Positioning time	1 ms–10 ms
	Input Signal	Position reference	Network-type instructions are from PROFINET communication Local mode supported
Position control mode	DI signal	DI signal function assignment	5 DIs
			P-OT (positive limit switch) N-OT (negative limit switch) HomeSwitch (home switch) TouchProbe1 (touch probe 1) TouchProbe2 (touch probe 2)
	Digital output signal	Output signal function selection	3 DOs With-load capacity: 50 mA Voltage range: 5 V to 30 V
			S-RDY: Servo ready TGON: motor rotation output Comparison output, brake output, EDM output

Item			Description
Built-in functions	Overtravel (OT) limit		The servo drive stops immediately when P-OT or N-OT is active
	Protection		Protections against overcurrent, overvoltage, undervoltage, overload, main circuit detection error, heatsink overheat, overspeed, encoder error, CPU error, and parameter error
	LED display		Main power supply CHARGE indicator, 5-digit LED display
	Vibration Suppression		Four notches (including two adaptive notches) available, 50 Hz to 5000 Hz
	Communication Function	Connection protocol	RS232 PROFINET
		Multi-station communication	Max. number of connections 247 (RS232), 65535 (PROFINET, PLC-dependent)
		Axis address setting	Set through software, 0 to 247 (RS232), automatic assignment by host controller (PROFINET)
		Function	Including status display, user parameter setting, monitored value display, fault tracing display, JOG and auto-tuning, and speed/torque reference signal observation
	Others		Gain tuning, alarm record, JOG

Note

[1] The temperature of the environment where the servo drive is installed must be within the range specified in the preceding table. When the servo drive is installed into a control cabinet, the temperature inside the cabinet must also be within this range.

2.2.3 Profinet Communication Technical Specifications

Profinet Comprehensive Parameters	
Item	Description
Communication protocol	Profinet
Process Data	RT and IRT
Acyclic	Support for access to industry standard parameters and function code parameters
Bus period	RT mode: min. 1 ms IRT mode: min. 500 us
Sync jitter	< 1us
Physical layer	100BASE-TX
Baud rate	100 Mbits/s (100Base-TX)
Duplex mode	Full duplex
Topology	Ring, linear, star, and tree types
Transmission medium	Shielded cables of Cat 5e or higher
Number of slaves	Up to 65535 (dependent on the performance of the PLC) Proven: 100
Communication code error rate	10^{-10} Ethernet standard
I&M data	I&M0 to I&M4
Configuration version	TIA Portal V13 SP1 or higher STEP7 V5.5 SP4 or higher

Profinet Comprehensive Parameters	
Item	Description
Profinet version	V2.4
Profinet interface	Number of ports: 2

Function	Profinet IO devices, support for medium redundancy
Alarm/diagnosis information	Yes
DCP CALL (search for device)	Yes
MRP (ring-type network)	Yes
MRPD (Quick reset ring-type network)	Yes
Profinet system redundancy	Yes
Start priority	Yes
Disabled port	Yes
No configuration is required when you change the configuration.	Yes

2.2.4 Dynamic Brake Characteristic Curve

According to the motor model, initial speed and load inertia, the dynamic braking distance can be estimated. The approximate value of the dynamic braking distance can be calculated by the following formula. For the accurate value, please use the dynamic braking calculation function provided by our software.

Maximum braking distance s (turn) is:

$$s = \frac{V_0}{60}\left(t_e + (\tau_1 + \tau_2 V_0^2)\left(1 + \frac{J_L}{J_M}\right)\right)$$

The coefficient is as follows:

$$\tau_1 = \frac{2R_s J}{3p_n^2 \Psi_f^2} = \frac{10000\pi^2 R_s J}{9K_e^2}$$

$$\tau_2 = \frac{\pi^2 L_d^2 J}{4050 R_s \Psi_f^2} = \frac{100 L_d^2 \pi^4 P_n^2 J}{243 R_s K_e^2}$$

$$\Psi_f = \frac{\sqrt{6} K_e}{100\pi P_n}$$

- V_0: Maximum feedback speed
- t_e: Dynamic brake program and relay delay
- J_L: Load moment of inertia
- J_M: Motor moment of inertia
- P_n: Number of motor pole pairs
- R_s: Stator resistance (Ω)
- L_q, L_d: q-axis inductance (mH), d-axis inductance (mH).

2.2.5 Load Moment of Inertia

The load moment of inertia represents the inertia of the load. The larger the load moment of inertia is, the weaker the responsiveness is. An excessively high inertia may result in unstable motion. The allowable load moment of inertia of the motor is restricted. This value is provided strictly as a guideline and varies with the motor driving conditions.

An overvoltage warning may occur during deceleration if the load moment of inertia exceeds the allowable value. For servo drives with a built-in regenerative resistor, an overload alarm my be present. In case of such alarms, take one of the following measures：

- Reduce the torque limit values.
- Reduce the deceleration rate.
- Reduce the maximum speed.
- Install an external braking resistor if the alarm cannot be cleared using the above measures.



- Check the drive selection guide for the built-in brake.
- Even you use a built-in resistor, the energy generated in some conditions will exceed the allowable capacity loss (W) of the resistor. In this case, an external braking resistor is required.

3 MS1-R Series Motor

3.1 Product Information

3.1.1 Model and Nameplate

Model Description

MS1 H1 - 75B 30C B A3 3 1 R - *
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① **MS1 series servo motor**	② **Inertia and capacity** H1: low inertia, small capacity H2: low inertia, medium capacity H3: medium inertia, medium capacity H4: medium inertia, small capacity	③ **Rated power (W)** One letter and two digits B: x 10 C: x 100 Example: 75B: 750 W
④ **Rated speed (rpm)** One letter and two digits B: x 10 C: x 100 Example: 30C: 3,000 rpm	⑤ **Voltage class (V)** B: 220 D: 380	⑥ **Encoder type** One letter and one digit A6: 26-bit multi-turn absolute encoder S6: 26-bit multi-turn absolute encoder of functional safety type A3: 23-bit multi-turn absolute encoder T3: 18-bit multi-turn absolute encoder
⑦ **Shaft connection mode** 3: Solid shaft with key and threaded hole	⑧ **Brake, reducer, oil seal**[1] 0: Without oil seal + without brake 1: With oil seal + without brake 2: Without oil seal + with brake 4: With oil seal + with brake	⑨ **Series** R: R version ⑩ **Non-standard functions** _: Standard S: Flying leads type -**: Other non-standard function

Note

- [1] The standard configuration of the motor in flange size 40 does not include the oil seal. Motors of other models carry the oil seal as standard.

Nameplate description

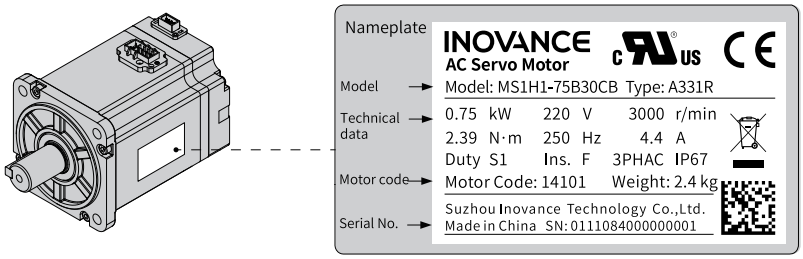


Figure 3-1 Description of the model and nameplate

3.1.2 Components

Motor (Flange sizes 40&60&80)

- **Servo motors with terminal box**

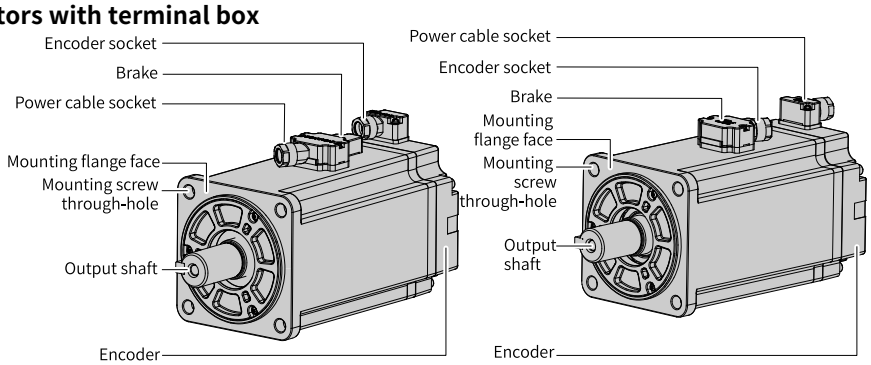


Figure 3-2 Components of motors with terminal box (left: front outlet; right: rear outlet)

- **Servo motors with flying leads**

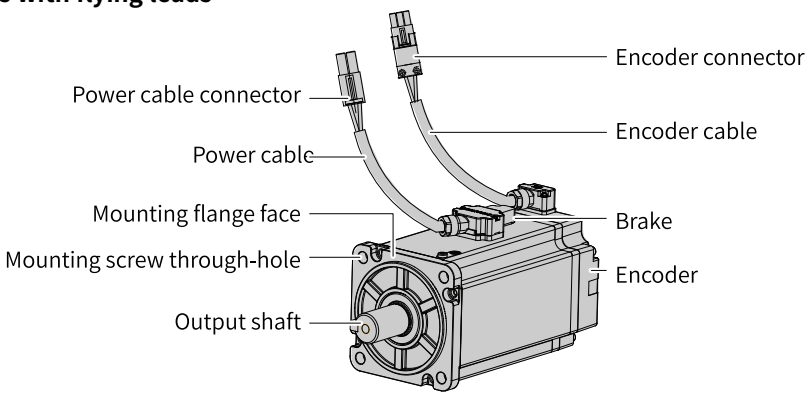


Figure 3-3 Components of motors with flying leads

Motor (Flange sizes 100&130&180)

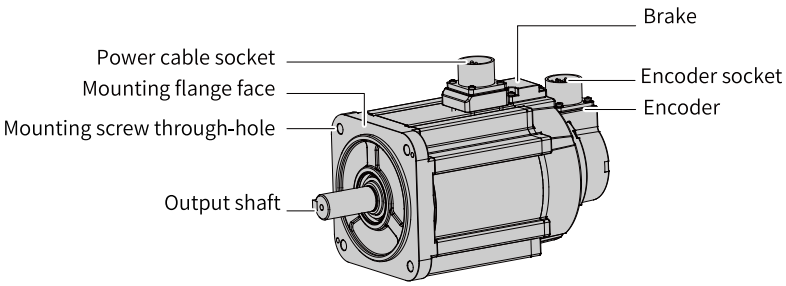


Figure 3-4 Components of servo motors in flange sizes 100/130/180

3.1.3 Motor Models

Motor type		Rated Output Capacity (kW)	Rated speed (max. speed) (RPM)	Encoder	IP rating of the enclosure
Low inertia, small capacity	MS1H1 	0.05, 0.1, 0.2, 0.4, 0.55, 0.75, 1.0	3000 (6000)	A3: 23-bit multi-turn absolute encoder	IP67
Low inertia, medium capacity	MS1H2 	1.0, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0	3000 (6000)	A3: 23-bit multi-turn absolute encoder	IP67
Medium inertia, medium capacity	MS1H3 	0.85, 1.3, 1.8, 2.9, 4.4, 5.5, 7.5	1500 (3000)	A3: 23-bit multi-turn absolute encoder	IP67
Medium inertia, small capacity	MS1H4 	0.1, 0.2, 0.4, 0.55, 0.75, 1.0	3000 (6000)	A3: 23-bit multi-turn absolute encoder	IP67

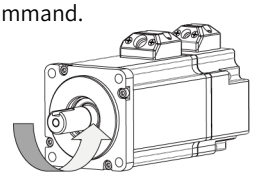
Note

The MS1-R series servo motor with frame size 40 is upcoming.

3.2 Motor Specifications

3.2.1 Mechanical Characteristics

Item	Description
Duty type	S1(Continuous duty)
Vibration level[1]	V15

Item		Description
Insulation resistance		500 VDC, above 10 MΩ
Excitation mode		Permanent magnetic
Installation method		Flange type
Heat resistance level		F
Insulation voltage		1500 VAC, 1 min (220 V class) 1800 VAC, 1 min (380 V class)
IP rating of the enclosure		IP67 (excluding shaft opening and flying leads type motor connectors)
Direction of rotation		Rotates counterclockwise when viewed from the shaft extension side with the forward run command.  CCW
Operating conditions	Ambient temperature	0°C to 40°C (non-freezing) (Derate based on the derating curve for temperatures above 40°C.)
	Ambient humidity	20%–80% (no condensation)
	Installation location	• Free from corrosive or explosive gases • Well ventilated and with minimum amount of dust, waste and moisture • Convenient for inspection and cleanup • Derating required only for altitudes above 1000 m *"3.2.3 Derating Characteristics" on page 34* • Away from sources that may generate strong magnetic field • Away from heating sources such as a heating stove • Use the motor with oil seal in places with grinding fluid, oil mist, iron powders or cuttings. • The oil seal is only dust-proof. It cannot withstand the intrusion of oil in a long term. • No applicable to vacuum environment • Not applicable to inching condition, which may result in stuck • The motor with brake may generate a pattering sound. • Coupler type and installation alignment requirements • The system should avoid continuous operation at natural frequency. Exceeding the allowable vibration value may damage the system.
	Storage environment	Observe the following requirements for keeping a de-energized motor. • Temperature: -20°C to +60°C (non-freezing) • Humidity: 20% to 80% RH (no condensation)
Shock resistance [2]	Shock acceleration (taking flange side as standard)	490 m/s^2
	Times of shock	2
Vibration resistance[3]	Vibration acceleration (taking flange side as standard)	49 m/s^2

Note

- [1]Vibration level V15 indicates that the vibration amplitude is less than 15 μm when a single servo motor rotates at rated values.
- [2] The resistance for shock in the vertical direction when the servo motor is mounted with the shaft in a horizontal position is shown in the preceding table.
- [3] For a servo motor shaft mounted horizontally, the vibration resistance level in the up/down, left/right, and front/rear directions is shown in the preceding table.
- The strength of the vibration that the servo motor can withstand depends on the application. Check the vibration acceleration rate applied to the servo motor through the actual product.

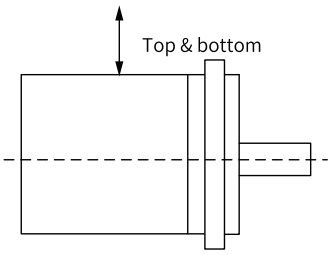


Figure 3-5 Shock applied on the motor

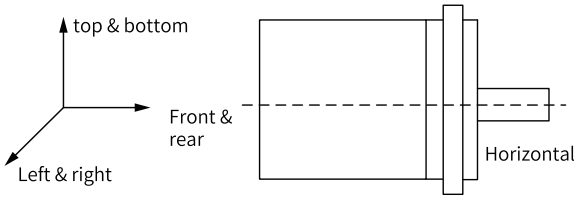


Figure 3-6 Vibration applied on the motor

3.2.2 Overload Characteristics

The equipment is compliant with NEC and CEC requirements and equipped with protective functions against overload and overtemperature.

For effective protection of different load motors, set the motor overload protection gain according to the motor overload capacity. Use the default gains in general conditions, however, when one of the following condition occurs, change the gains based on the temperature rise condition of the motor:

- The motor operates in environments with high temperature.
- The motor is in cyclic motion featuring a short motion cycle and frequent acceleration/ deceleration.
- The thermal overload protection only occurs during continuous operation. In this case, power off the drive to check the motor temperature.

The motor overload protection curve is shown in the following figure.

- **MS1H1/MS1H4**

Load ratio (%)	Operating time (s)
120	230
130	80
140	40
150	30
160	20

Load ratio (%)	Operating time (s)
170	17
180	15
190	12
200	10
210	8.5
220	7
230	6
240	5.5
250	5
300	3
350	2

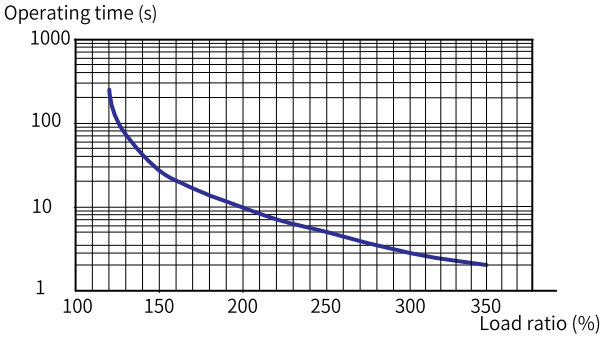


Figure 3-7 MS1H1 and MS1H4 series motor overload curves

Note

The maximum torque of MS1H1 and MS1H4 models is 3.5 times the rated torque.

- **MS1H2/MS1H3**

Load ratio (%)	Operating time (s)
115	6000
121.4	2000
127.8	1000
134.2	800
140.6	500
147	300
153.4	150
159.8	100
166.2	80
172.6	60
179.0	50
185.4	45
191.8	40
198.2	36
204.6	32
211.0	28
217.4	23
223.8	22
230.2	19
236.6	18
243.0	15

Load ratio (%)	Operating time (s)
249.4	14
255.8	13
262.2	11
268.6	10
275.0	9
281.4	8
287.8	7
294.2	6

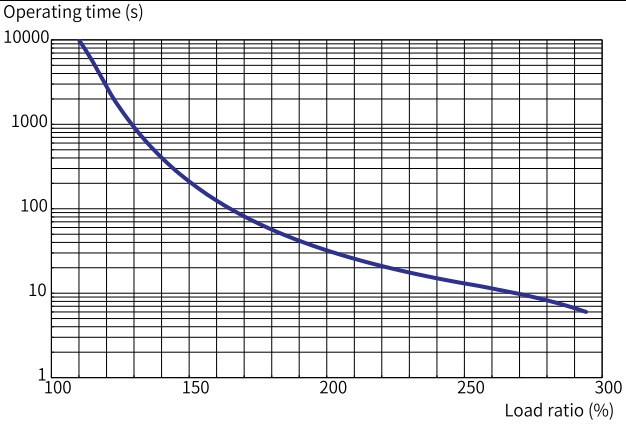


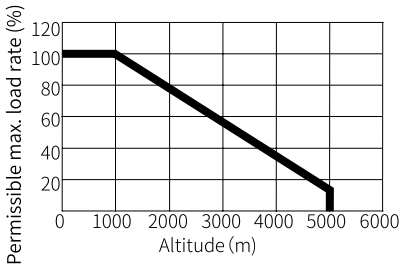
Figure 3-8 MS1H2 and MS1H3 series motor overload curves

Note

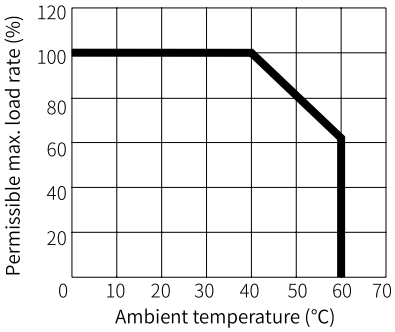
- The maximum torque of H2 models is three times the rated torque.
- The maximum torque of H3 models is 2.5 times the rated torque.

3.2.3 Derating Characteristics

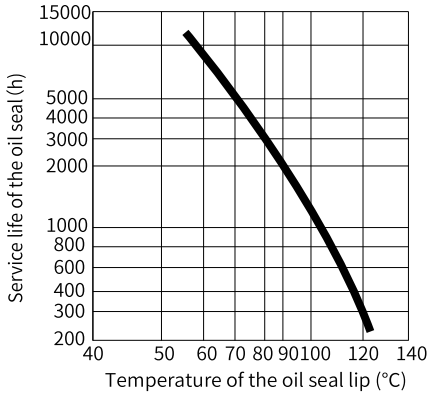
- **Altitude-based derating curve**



- **Temperature-based derating curve**

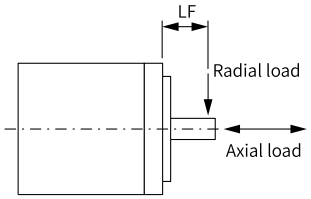


3.2.4 Temperature Curve of the Oil Seal

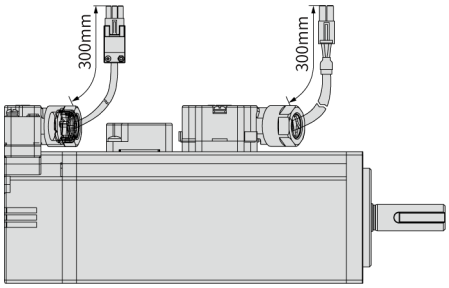


3.3 Selection Instructions

- Description of the torque-speed characteristics curve:
  - Technical data and torque/speed characteristic values in the following tables are applicable to motors working with Inovance servo drives with the the armature coil temperature being 20°C.
  - Continuous working area: refers to a series of states in which the motor can operate safely and continuously, and the actual torque must be located in this area.
  - Short-time working area: refers to a series of states in which the motor can run in a short time when the actual torque is greater than the rated torque.
- The characteristic parameter values are obtained in cases where the motor is installed with the following heatsink:
  - MS1H1/MS1H4: 250 × 250 × 6 (mm) (aluminum)
  - MS1H2-10C to 25C: 400 × 400 × 20 (mm) (steel)
  - MS1H2-30C to 50C: 400 × 400 × 20 (mm) (steel)
  - MS1H3-85B to 18C: 400 × 400 × 20 (mm) (steel)
  - MS1H3-29C to 55C: 550 × 550 × 30 ((mm) (aluminum)
  - MS1H3-75C: 700 × 700 × 30 (mm) (aluminum)
- Radial and axial loads of the motor:



- Dimensions of flying leads type motors
  The 40/60/80-flange flying leads type motor (with “-S”) provides a drain wire of about 300 mm long, as shown in the following figure.



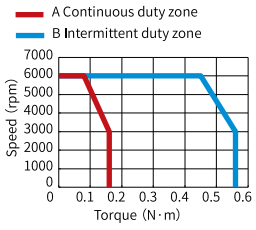
- MS1H3 (130-flange and 180-flange) comes with a key slot. When the operating speed is above 3000 rpm, the motor must run with the key. If you need to run the motor without the key, you can ask for customization from Inovance.

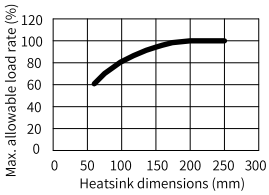
Note

- The data in the () is the value of the servo motor with the brake.
- The motor with oil seal must be derated by 10% during use.
- It is recommended that the cross sectional area of brake cables is above 0.5 mm^2.
- The brake must not share the power supply with other electrical devices. This is to prevent a malfunction of the brake due to a drop in the voltage or current when other electrical devices work in tandem.
- The holding brake cannot be used for braking purpose.
- The release time and operation time of the brake depend on the discharge circuit. Be sure to confirm the operation delay of your equipment before use.
- You need to prepare the 24 VDC power supply yourself.
- The tightening tension for terminal screws must be between **0.19 N·m to 0.21 N·m**, exceeding of which may damage the terminal.

3.4 Motors with Low Inertia and Small Capacity (MS1H1)

3.4.1 MS1H1-05B30CB-A33*Z

Motor specifications		Torque-Speed characteristics
Flange size (mm)	40	
Inertia, capacity	Low inertia, small capacity	
Rated power (kW)	0.05	
Rated voltage	220	
Rated torque (N·m)	0.16	
Maximum torque (N·m)	0.56	
Rated current (Arms)	1.3	Heatsink-based derating curve

Motor specifications			Torque-Speed characteristics
Maximum current (Arms)	4.70		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.15		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.026	
	Motor with brake	0.028	

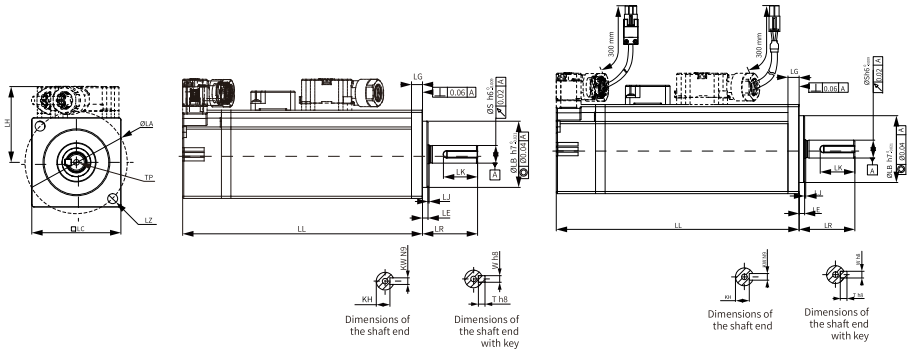
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω)(±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.1	94.4	0.25	⩽ 40	⩽ 20	⩽ 1.5

Allowable load

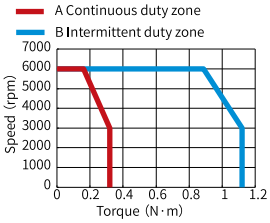
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	78	54

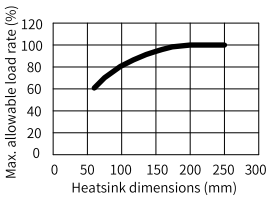
Dimensions (mm)



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
65.4 (96)	40	25±0.3	46	2-Ø4.5	34.3	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
8	Ø30h7$^{0}_{-0.021}$	M3x6	15.5	6.2-^{0}0.1	3	3	3	0.39 (0.50)

3.4.2 MS1H1-10B30CB-A33*Z

Motor specifications		Torque-Speed characteristics
Flange size (mm)	40	
Inertia, capacity	Low inertia, small capacity	
Rated power (kW)	0.1	
Rated voltage	220	
Rated torque (N·m)	0.32	
Maximum torque (N·m)	1.12	
Rated current (Arms)	1.3	Heatsink-based derating curve

Motor specifications			Torque-Speed characteristics
Maximum current (Arms)	4.70		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.26		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.041	
	Motor with brake	0.043	

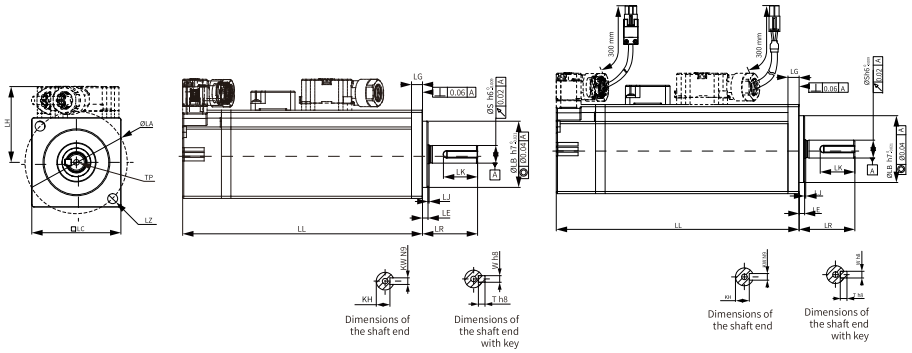
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω)(±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.1	94.4	0.25	⩽ 40	⩽ 20	⩽ 1.5

Allowable load

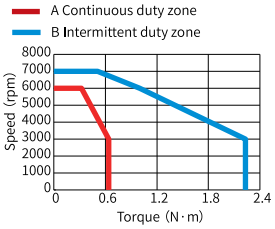
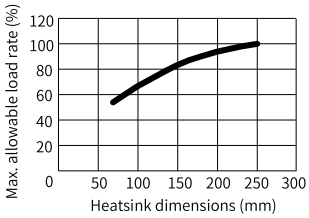
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	78	54

Dimensions (mm)



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
78.4 (110)	40	25±0.3	46	2-Ø4.5	34.3	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	KW	W	T	Weight (kg)
8	Ø30h7$^{0}_{-0.021}$	M3x6	15.5	6.2$^{0}_{-0.1}$	3	3	3	0.45 (0.64)

3.4.3 MS1H1-20B30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	60		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated current (Arms)	1.5		Heatsink-based derating curve
Maximum current (Arms)	5.8		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/Arms)	0.46		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.094	
	Motor with brake	0.106	

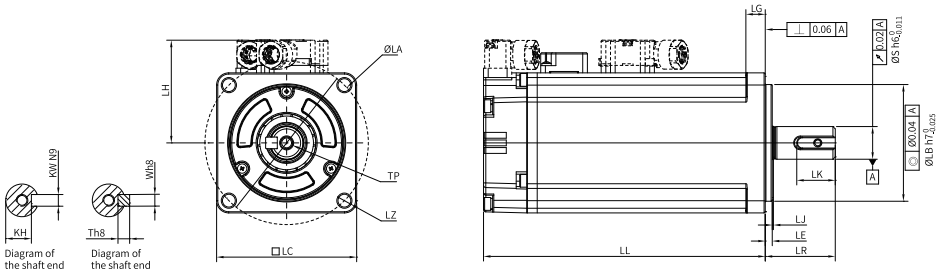
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	⩽ 60	⩽ 20	⩽ 1.5

Allowable load

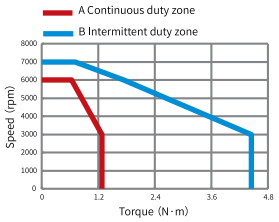
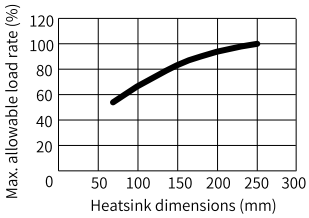
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	245	74

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
60	75.5 (103)	30±0.5	70	4- Ø 5.5	44	8.0	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø50h7$^{0}_{-0.025}$	14	M5x8	16.5	11$^{0}_{-0.1}$	5	5	5	0.80 (1.17)

3.4.4 MS1H1-40B30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	60		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.4		
Voltage (V)	220		
Rated torque (N·m)	1.27		
Maximum torque (N·m)	4.45		
Rated current (Arms)	2.5		Heatsink-based derating curve
Maximum current (Arms)	9.8		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/Arms)	0.53		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.145	
	Motor with brake	0.157	

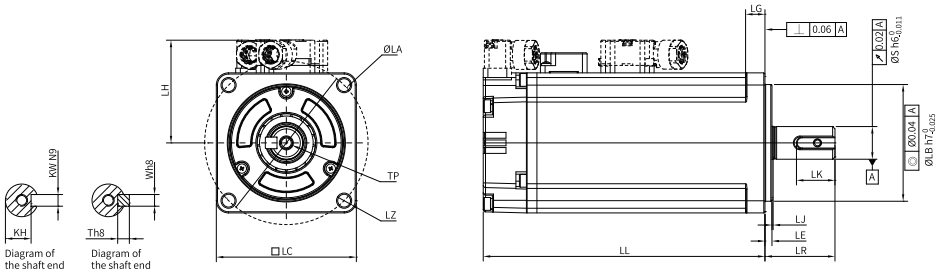
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	⩽ 60	⩽ 20	⩽ 1.5

Allowable load

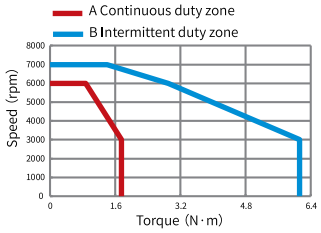
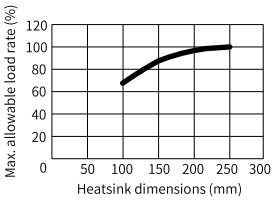
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	245	74

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
60	93 (121)	30 ± 0.5	70	4- Ø 5.5	44	8.0	3 ± 0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø50h7$^{0}_{-0.025}$	14	M5x8	16.5	11$^{0}_{-0.1}$	5	5	5	1.11 (1.48)

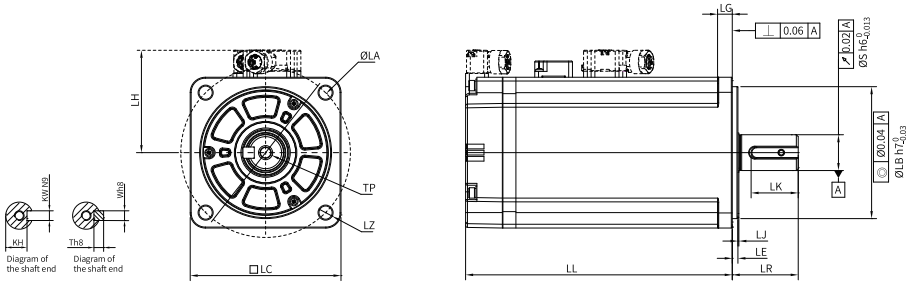
3.4.5 MS1H1-55B30CB-A331R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	80		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	0.55		
Voltage (V)	220		
Rated torque (N·m)	1.75		
Maximum torque (N·m)	6.13		
Rated current (Arms)	3.9		Heatsink-based derating curve
Maximum current (Arms)	15		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/Arms)	0.49		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.55	
	Motor with brake	-	

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

Dimensions (mm)

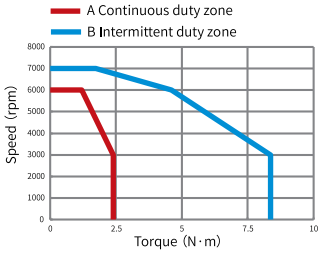


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	25±0.5	90	4- Ø 7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø70h7$^{0}_{-0.03}$	19	M6 x 20	26	15.5$^{0}_{-0.1}$	6	6	6	1.88

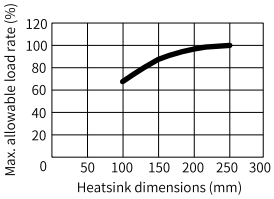
3.4.6 MS1H1-75B30CB-A33*R

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Low inertia, small capacity	
Rated power (kW)	0.75	
Voltage (V)	220	
Rated torque (N·m)	2.39	
Maximum torque (N·m)	8.37	
Rated current (Arms)	4.4	
Maximum current (Arms)	16.9	
Rated speed (rpm)	3000	
Maximum speed (rpm)	7000	
Torque coefficient (N·m/Arms)	0.58	
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.68
	Motor with brake	0.71

Torque-Speed characteristics



Heatsink-based derating curve



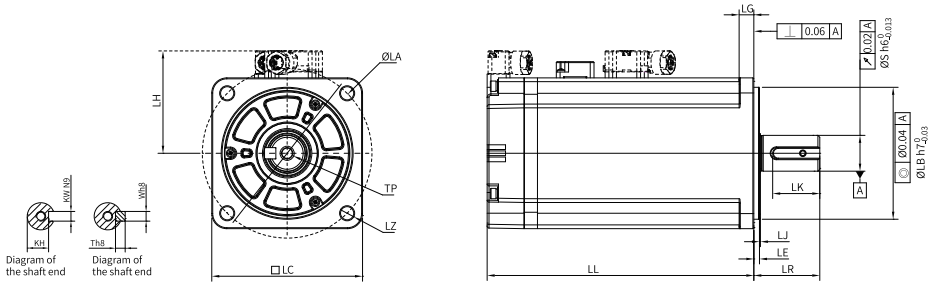
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	⩽ 60	⩽ 40	⩽ 1

Allowable load

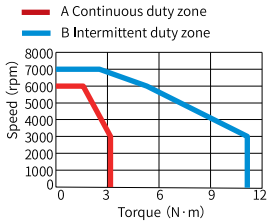
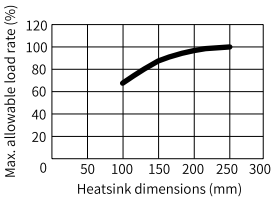
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (141.5)	25±0.5	90	4- Ø 7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø70h7$^{0}_{-0.03}$	19	M6 × 20	26	15.5$^{0}_{-0.1}$	6	6	6	2.22 (2.88)

3.4.7 MS1H1-10C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	80		
Inertia, capacity	Low inertia, small capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	11.13		
Rated current (Arms)	6.2		Heatsink-based derating curve
Maximum current (Arms)	24		
Rated speed (rpm)	3000		
Maximum speed (rpm)	7000		
Torque coefficient (N·m/Arms)	0.46		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.82	
	Motor with brake	0.87	

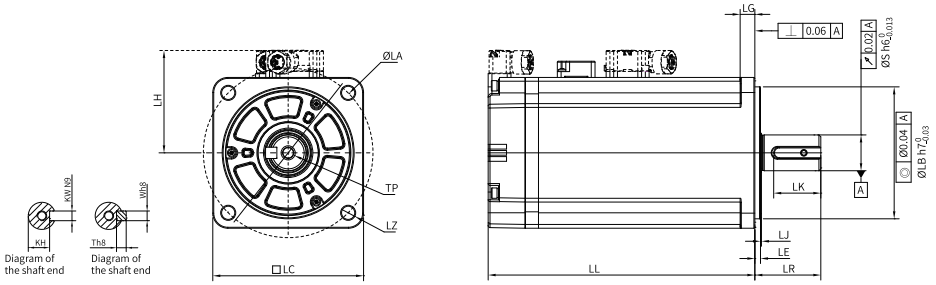
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	⩽ 60	⩽ 40	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

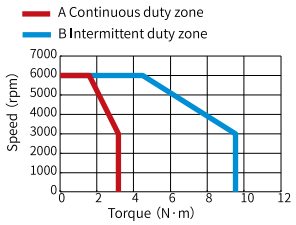
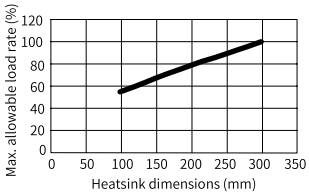
Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	119.2 (153.4)	25±0.5	90	4- Ø 7	54	7.5	3 ± 0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø 70h7$^{0}_{-0.03}$	19	M6 × 20	26	15.5$^{0}_{-0.1}$	6	6	6	2.61 (3.27)

3.5 Motors with Low Inertia and Medium Capacity (MS1H2)

3.5.1 MS1H2-10C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated current (Arms)	6.4		Heatsink-based derating curve
Maximum current (Arms)	23		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.54		
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	1.78	
	Motor with brake	2.6	

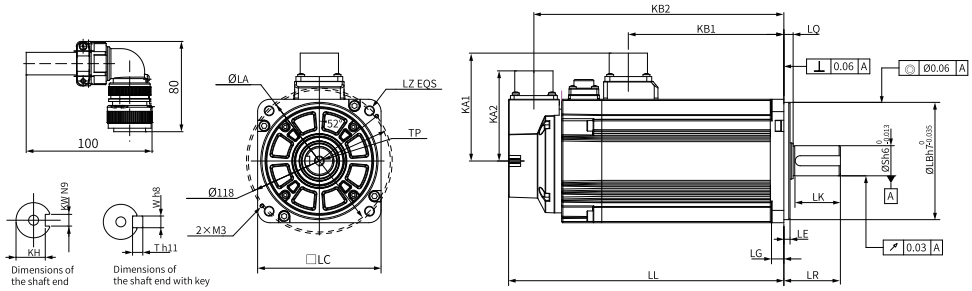
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

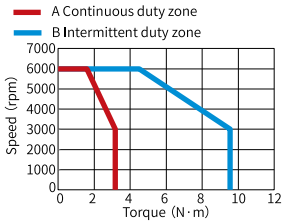
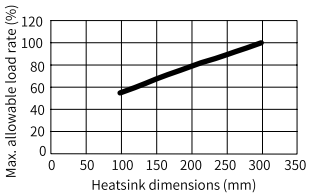
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45±1	115	4-Ø7	88	75	74	123.5 (151.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	3.85 (4.9)

3.5.2 MS1H2-10C30CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.0		
Voltage (V)	380		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	9.54		
Rated current (Arms)	3.3		Heatsink-based derating curve
Maximum current (Arms)	11		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	1.07		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.78	
	Motor with brake	2.6	

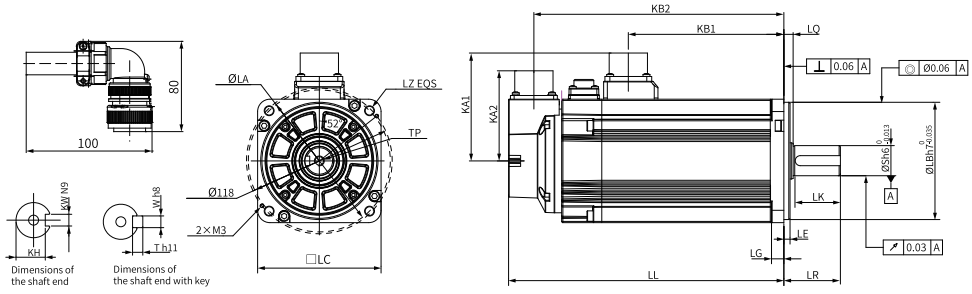
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

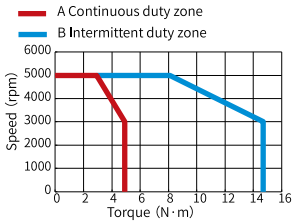
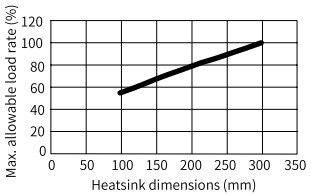
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	144 (172)	45±1	115	4-Ø7	88	75	74	123.5 (151.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	3.85 (4.9)

3.5.3 MS1H2-15C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	220		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated current (Arms)	8.6		Heatsink-based derating curve
Maximum current (Arms)	32		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	0.62		
Rotor moment of inertia (kg·cm^2)	Motor without brake	2.35	
	Motor with brake	3.17	

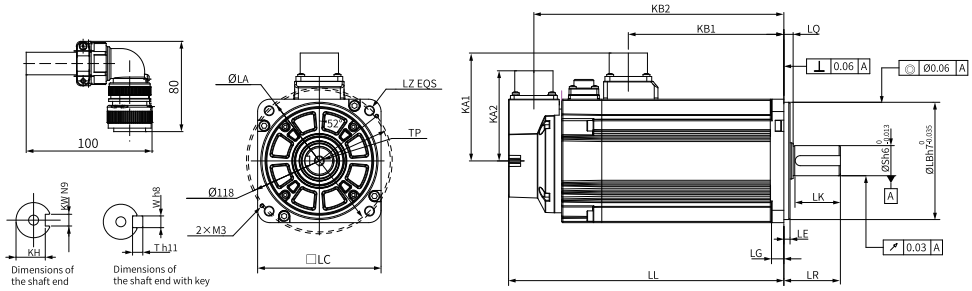
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

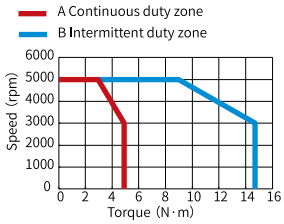
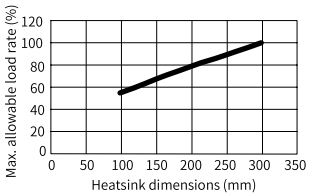
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45±1	115	4-Ø7	88	92	74	140.5 (168.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	4.65 (5.75)

3.5.4 MS1H2-15C30CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	1.5		
Voltage (V)	380		
Rated torque (N·m)	4.9		
Maximum torque (N·m)	14.7		
Rated current (Arms)	4.2		Heatsink-based derating curve
Maximum current (Arms)	14		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	1.28		
Rotor moment of inertia (kg·cm^2)	Motor without brake	2.35	
	Motor with brake	3.17	

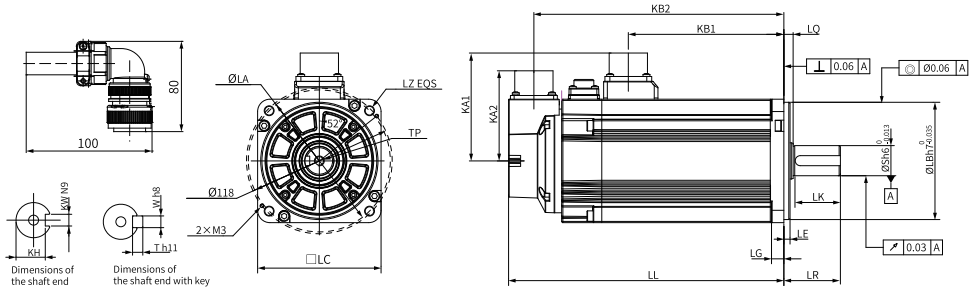
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

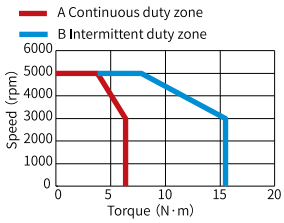
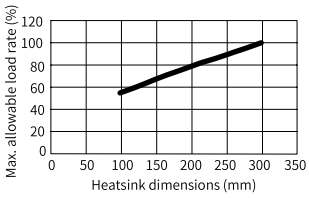
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	161 (189)	45±1	115	4-Ø7	88	92	74	140.5 (168.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	4.65 (5.75)

3.5.5 MS1H2-20C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	220		
Rated torque (N·m)	6.36		
Maximum torque (N·m)	15.5		
Rated current (Arms)	11.3		Heatsink-based derating curve
Maximum current (Arms)	32		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	0.60		
Rotor moment of inertia (kg·cm^2)	Motor without brake	2.92	
	Motor with brake	3.74	

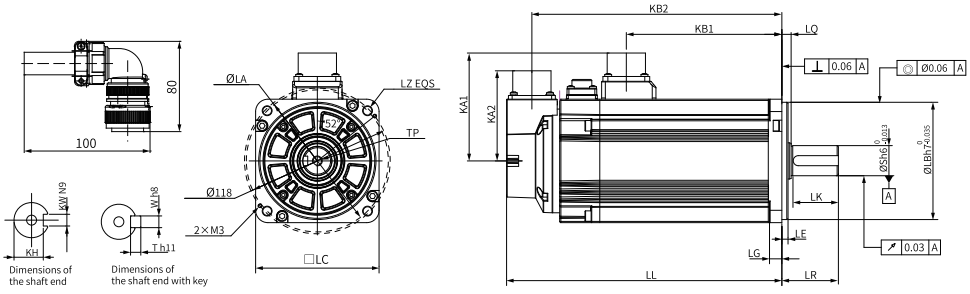
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

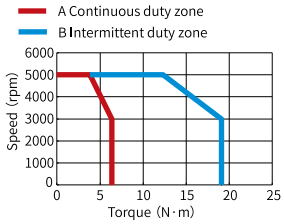
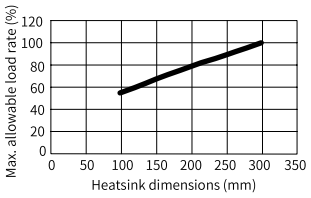
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45±1	115	4-Ø7	88	108	74	156.5 (184.5)	10	5±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	5.5 (6.55)

3.5.6 MS1H2-20C30CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.0		
Voltage (V)	380		
Rated torque (N·m)	6.36		
Maximum torque (N·m)	19.1		
Rated current (Arms)	5.6		Heatsink-based derating curve
Maximum current (Arms)	20		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	1.19		
Rotor moment of inertia (kg·cm^2)	Motor without brake	2.92	
	Motor with brake	3.74	

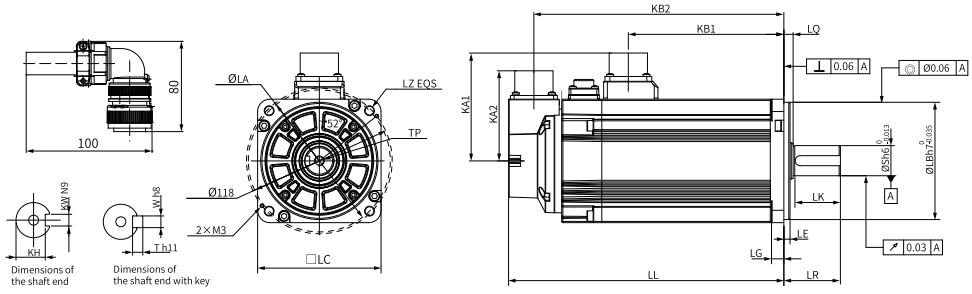
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)

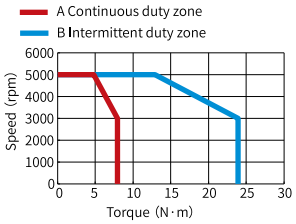


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	177 (205)	45±1	115	4-Ø7	88	108	74	156.5 (184.5)	10	5±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	5.5 (6.55)

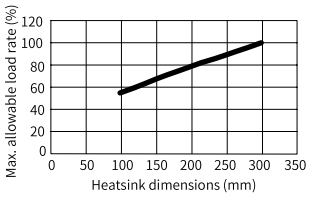
3.5.7 MS1H2-25C30CB-A33*R

Motor specifications		
Flange size (mm)	100	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	2.5	
Voltage (V)	220	
Rated torque (N·m)	7.96	
Maximum torque (N·m)	23.9	
Rated current (Arms)	14.7	
Maximum current (Arms)	53	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	0.60	
Rotor moment of inertia (kg·cm^2)	Motor without brake	3.49
	Motor with brake	4.3

Torque-Speed characteristics



Heatsink-based derating curve



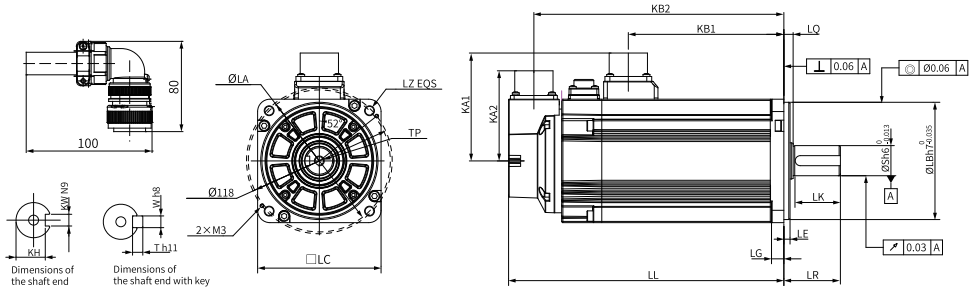
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

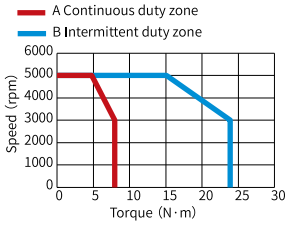
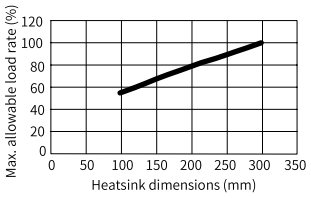
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
100	195 (223)	45±1	115	4-Ø7	88	126	73	174.5 (202.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	6.3 (7.35)

3.5.8 MS1H2-25C30CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	100		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	2.5		
Voltage (V)	380		
Rated torque (N·m)	7.96		
Maximum torque (N·m)	23.9		
Rated current (Arms)	7.2		Heatsink-based derating curve
Maximum current (Arms)	26		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	1.18		
Rotor moment of inertia (kg·cm^2)	Motor without brake	3.49	
	Motor with brake	4.3	

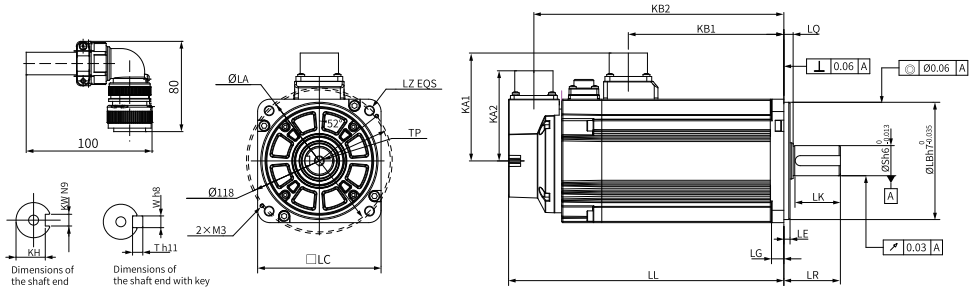
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	17.6	32.73	0.73	⩽ 100	⩽ 40	⩽ 1

Allowable load

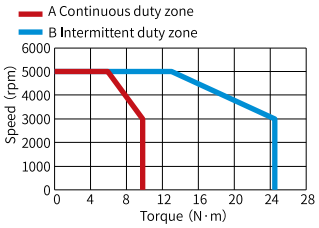
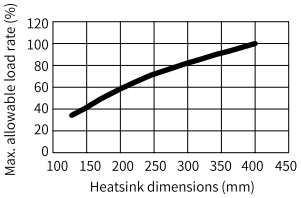
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
45	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
100	195 (223)	45±1	115	4-Ø7	88	126	74	174.5 (202.5)	10	5±0.3
LQ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
7.5±0.75	Ø95h7$^{0}_{-0.035}$		24	M8x16	36	20$^{0}_{-0.2}$	8	8	7	6.3 (7.35)

3.5.9 MS1H2-30C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	3.0		
Voltage (V)	220		
Rated torque (N·m)	9.8		
Maximum torque (N·m)	24.5		
Rated current (Arms)	16.6		Heatsink-based derating curve
Maximum current (Arms)	55		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	0.67		
Rotor moment of inertia (kg·cm^2)	Motor without brake	6.4	
	Motor with brake	9.38	

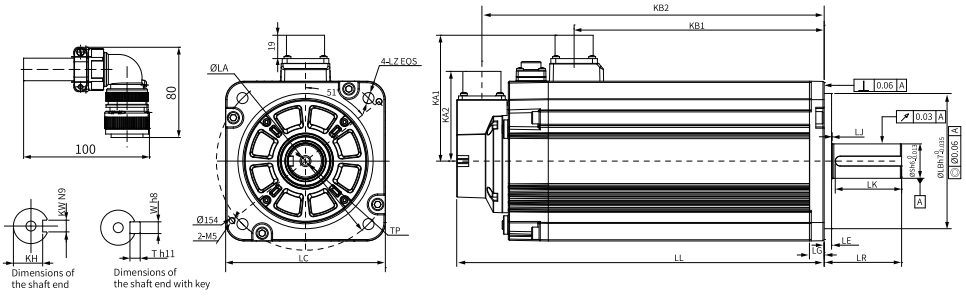
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

Dimensions (mm)

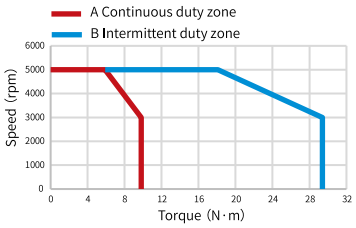


LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
130	198 (223)	63±1	145	4-Ø9	102.4	127.5	73	177.5 (202.5)	12	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	10.0 (11.9)

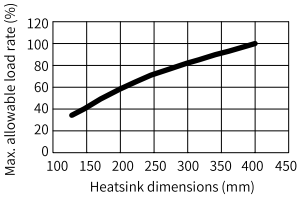
3.5.10 MS1H2-30C30CD-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	3.0	
Voltage (V)	380	
Rated torque (N·m)	9.8	
Maximum torque (N·m)	29.4	
Rated current (Arms)	8.9	
Maximum current (Arms)	29	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	1.25	
Rotor moment of inertia (kg·cm^2)	Motor without brake	6.4
	Motor with brake	9.38

Torque-Speed characteristics



Heatsink-based derating curve



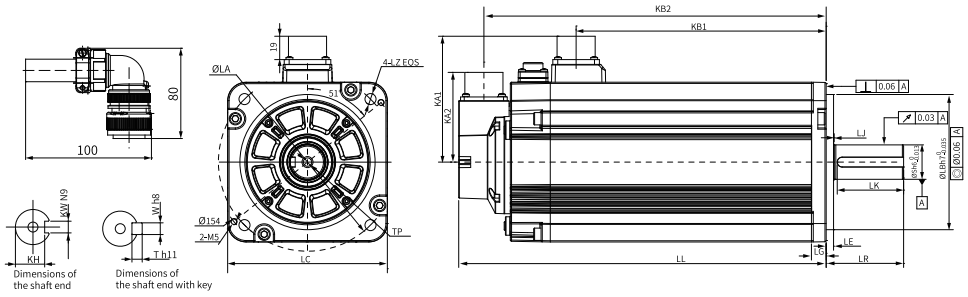
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

Dimensions (mm)

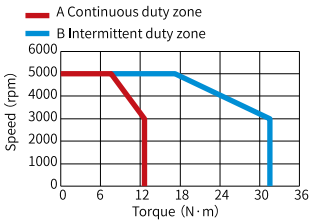


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	198 (223)	63±1	145	4-Ø9	102.4	127.5	74	177.5 (202.5)	12	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	10.0 (11.9)

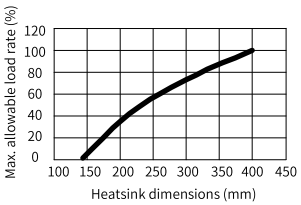
3.5.11 MS1H2-40C30CB-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	4.0	
Voltage (V)	220	
Rated torque (N·m)	12.6	
Maximum torque (N·m)	31.5	
Rated current (Arms)	22	
Maximum current (Arms)	67.5	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	0.65	
Rotor moment of inertia (kg·cm^2)	Motor without brake	9
	Motor with brake	11.98

Torque-Speed characteristics



Heatsink-based derating curve



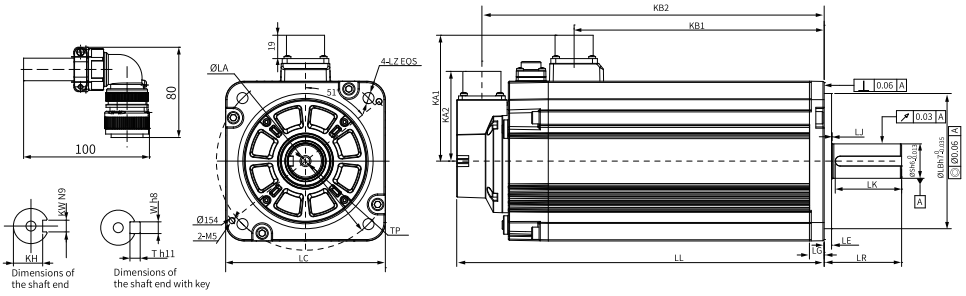
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

Dimensions (mm)

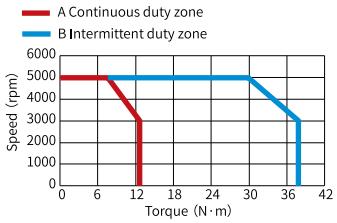


LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
130	236 (261)	63±1	145	4-Ø9	102.4	165.5	73	215.5 (240.5)	12	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	13.2 (15.1)

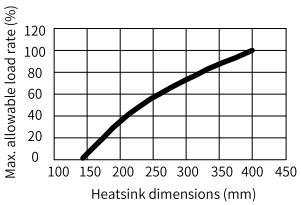
3.5.12 MS1H2-40C30CD-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	4.0	
Voltage (V)	380	
Rated torque (N·m)	12.6	
Maximum torque (N·m)	37.8	
Rated current (Arms)	13.5	
Maximum current (Arms)	42.5	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	1.06	
Rotor moment of inertia (kg·cm^2)	Motor without brake	9
	Motor with brake	11.98

Torque-Speed characteristics



Heatsink-based derating curve



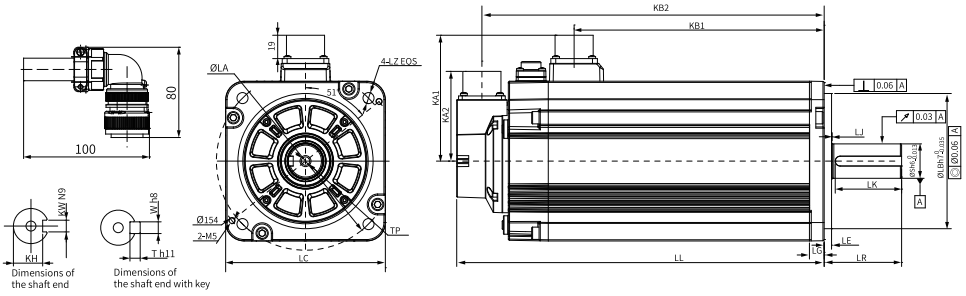
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

Dimensions (mm)



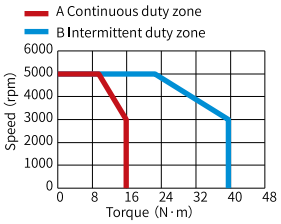
LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	236 (261)	63±1	145	4-Ø9	102.4	165.5	74	215.5 (240.5)	12	6±0.3

LJ	LB	S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$	28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	13.2 (15.1)

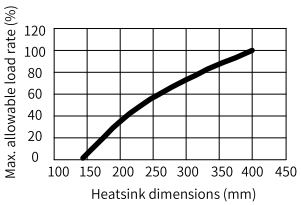
3.5.13 MS1H2-50C30CB-A33*R

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Low inertia, medium capacity	
Rated power (kW)	5.0	
Voltage (V)	220	
Rated torque (N·m)	15.8	
Maximum torque (N·m)	39.5	
Rated current (Arms)	22	
Maximum current (Arms)	67.5	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	0.81	
Rotor moment of inertia (kg·cm^2)	Motor without brake	11.6
	Motor with brake	14.58

Torque-Speed characteristics



Heatsink-based derating curve



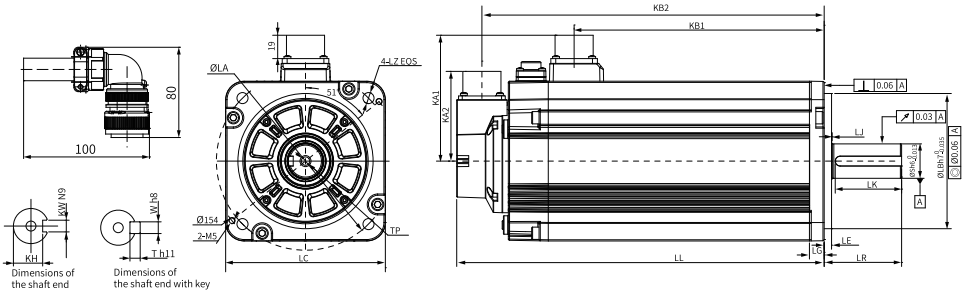
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

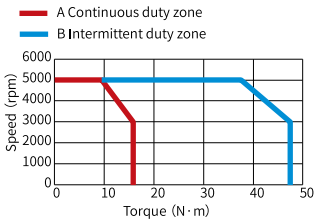
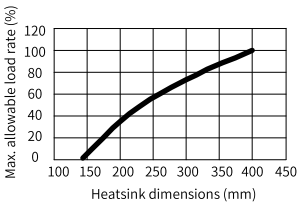
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
130	274 (299)	63±1	145	4-Ø9	102.4	203.5	73	253.5 (278.5)	12	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	16.35 (18.25)

3.5.14 MS1H2-50C30CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Low inertia, medium capacity		
Rated power (kW)	5.0		
Voltage (V)	380		
Rated torque (N·m)	15.8		
Maximum torque (N·m)	47.4		
Rated current (Arms)	17		Heatsink-based derating curve
Maximum current (Arms)	52.5		
Rated speed (rpm)	3000		
Maximum speed (rpm)	5000		
Torque coefficient (N·m/Arms)	1.04		
Rotor moment of inertia (kg·cm^2)	Motor without brake	11.6	
	Motor with brake	14.58	

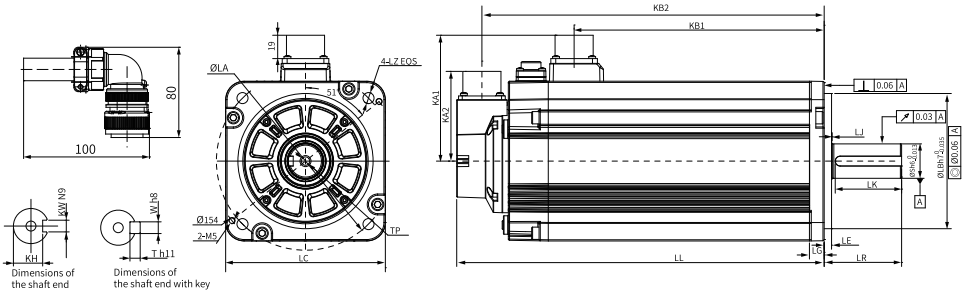
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	1176	392

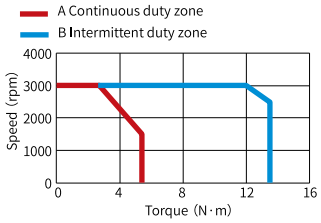
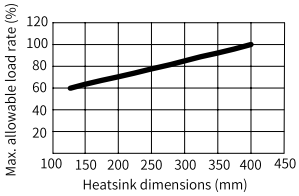
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	274 (299)	63±1	145	4-Ø9	102.4	203.5	74	253.5 (278.5)	12	6±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		28	M8 × 20	54	24$^{0}_{-0.2}$	8	8	7	16.35 (18.25)

3.6 Motors with Medium Inertia and Medium Capacity (MS1H3)

3.6.1 MS1H3-85B15CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	220		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated current (Arms)	6.6		Heatsink-based derating curve
Maximum current (Arms)	17.2		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	0.93		
Rotor moment of inertia (kg·cm^2)	Motor without brake	13.56	
	Motor with brake	15.8	

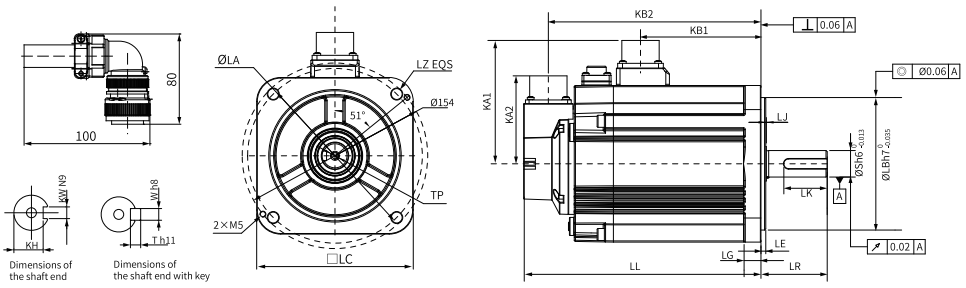
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

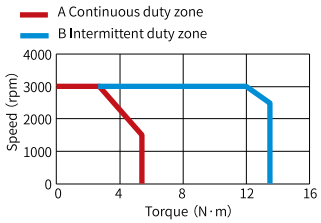
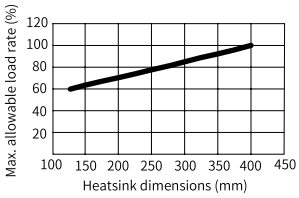
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55±1	145	4-Ø9	103	70	74	121.5 (146.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	5.8 (7.7)

3.6.2 MS1H3-85B15CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	0.85		
Voltage (V)	380		
Rated torque (N·m)	5.39		
Maximum torque (N·m)	13.5		
Rated current (Arms)	3.5		Heatsink-based derating curve
Maximum current (Arms)	8.5		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.84		
Rotor moment of inertia (kg·cm^2)	Motor without brake	13.56	
	Motor with brake	15.8	

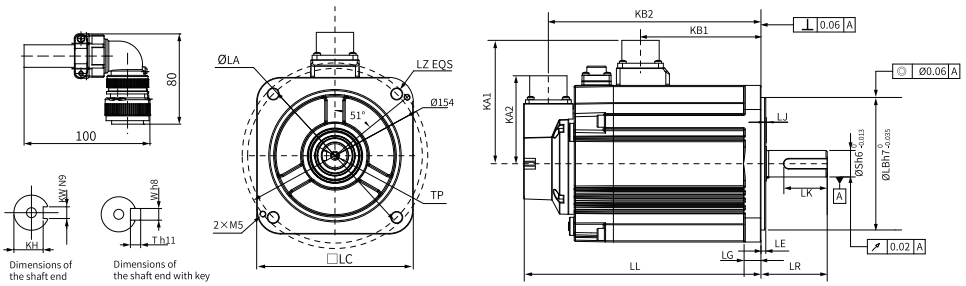
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

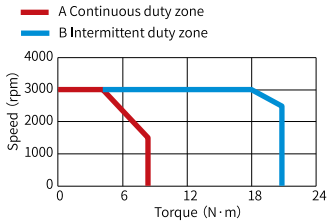
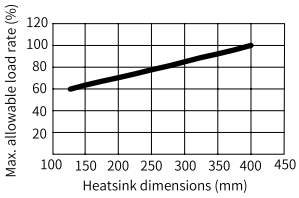
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	142 (167)	55±1	145	4-Ø9	103	70	74	121.5 (146.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	5.8 (7.7)

3.6.3 MS1H3-13C15CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	220		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated current (Arms)	10.5		Heatsink-based derating curve
Maximum current (Arms)	27.3		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	0.89		
Rotor moment of inertia (kg·cm^2)	Motor without brake	19.25	
	Motor with brake	21.5	

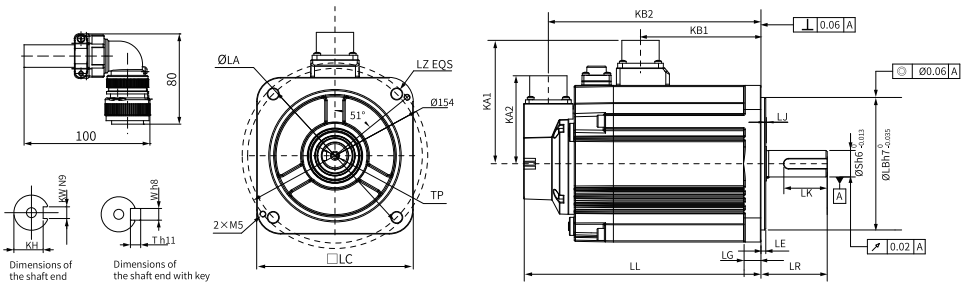
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

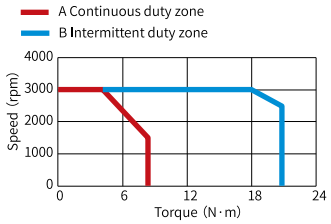
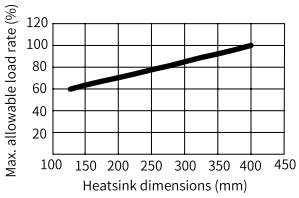
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55±1	145	4-Ø9	103	85	74	136.5 (161.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	7.1 (8.9)

3.6.4 MS1H3-13C15CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.3		
Voltage (V)	380		
Rated torque (N·m)	8.34		
Maximum torque (N·m)	20.85		
Rated current (Arms)	5.1		Heatsink-based derating curve
Maximum current (Arms)	12.6		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.85		
Rotor moment of inertia (kg·cm^2)	Motor without brake	19.25	
	Motor with brake	21.5	

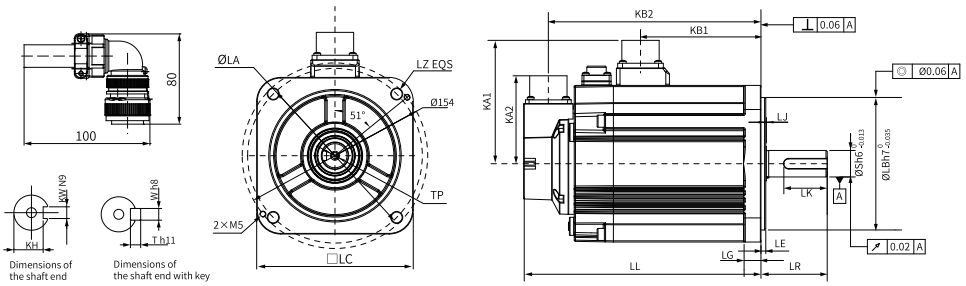
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

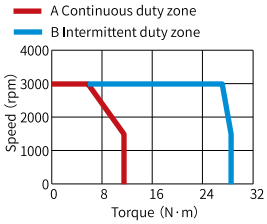
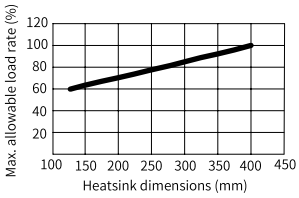
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	157 (182)	55±1	145	4-Ø9	103	85	74	136.5 (161.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	7.1 (8.9)

3.6.5 MS1H3-18C15CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.8		
Voltage (V)	220		
Rated torque (N·m)	11.5		
Maximum torque (N·m)	28.75		
Rated current (Arms)	11.9		Heatsink-based derating curve
Maximum current (Arms)	32.2		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.05		
Rotor moment of inertia (kg·cm^2)	Motor without brake	24.9	
	Motor with brake	27.2	

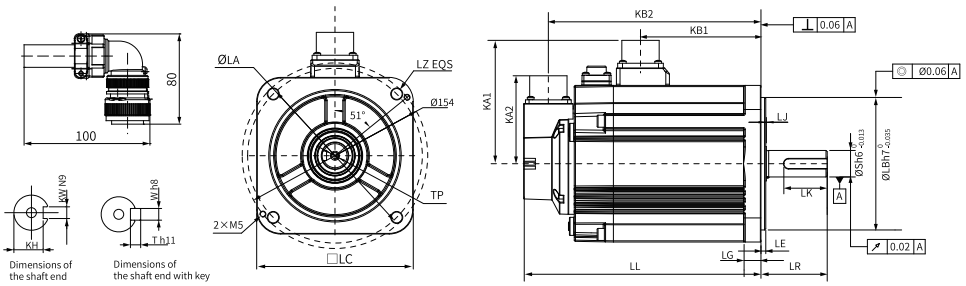
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

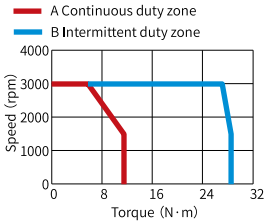
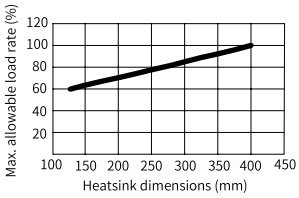
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55±1	145	4-Ø9	103	100	74	151.5 (176.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	8.5 (10.3)

3.6.6 MS1H3-18C15CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	130		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	1.8		
Voltage (V)	380		
Rated torque (N·m)	11.5		
Maximum torque (N·m)	28.75		
Rated current (Arms)	6.75		Heatsink-based derating curve
Maximum current (Arms)	17.7		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.87		
Rotor moment of inertia (kg·cm^2)	Motor without brake	24.9	
	Motor with brake	27.2	

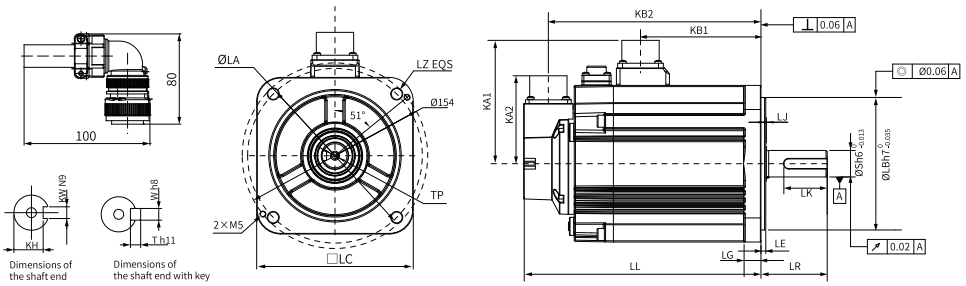
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	24	24	1	⩽ 120	⩽ 60	⩽ 1

Allowable load

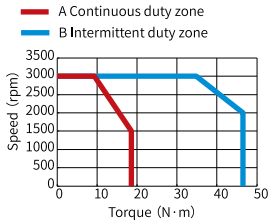
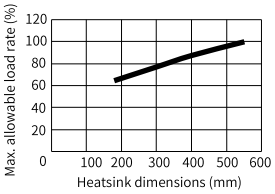
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
55	686	196

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
130	172 (197)	55±1	145	4-Ø9	103	100	74	151.5 (176.5)	14	4
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø110h7$^{0}_{-0.035}$		22	M6 × 20	36	18$^{0}_{-0.2}$	8	8	7	8.5 (10.3)

3.6.7 MS1H3-29C15CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	2.9		
Voltage (V)	220		
Rated torque (N·m)	18.6		
Maximum torque (N·m)	46.5		
Rated current (Arms)	18		Heatsink-based derating curve
Maximum current (Arms)	52.5		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.16		
Rotor moment of inertia (kg·cm^2)	Motor without brake	44.7	
	Motor with brake	52.35	

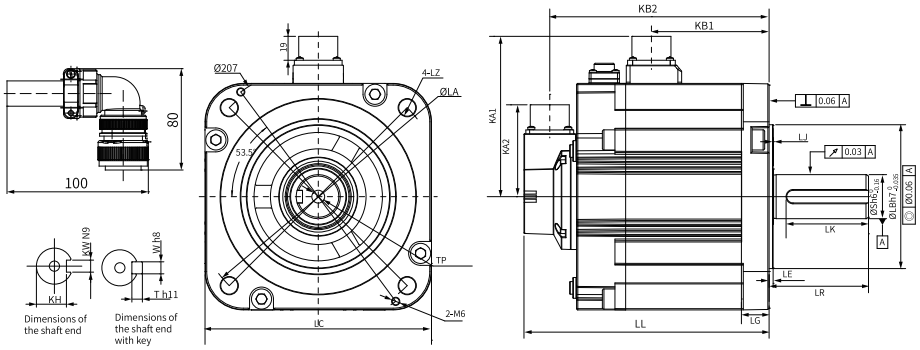
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

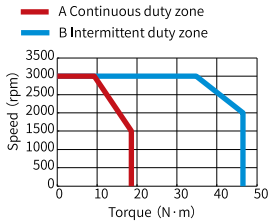
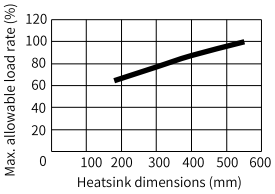
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	1470	490

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
180	161 (194.8)	79±1	200	4-Ø13.5	127.4	93.5	73	140.5 (174.3)	22	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$		35	M12x25	65	30$^{0}_{-0.2}$	10	10	8	13.8 (17.9)

3.6.8 MS1H3-29C15CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	2.9		
Voltage (V)	380		
Rated torque (N·m)	18.6		
Maximum torque (N·m)	46.5		
Rated current (Arms)	10.5		Heatsink-based derating curve
Maximum current (Arms)	29.75		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.94		
Rotor moment of inertia (kg·cm^2)	Motor without brake	44.7	
	Motor with brake	52.35	

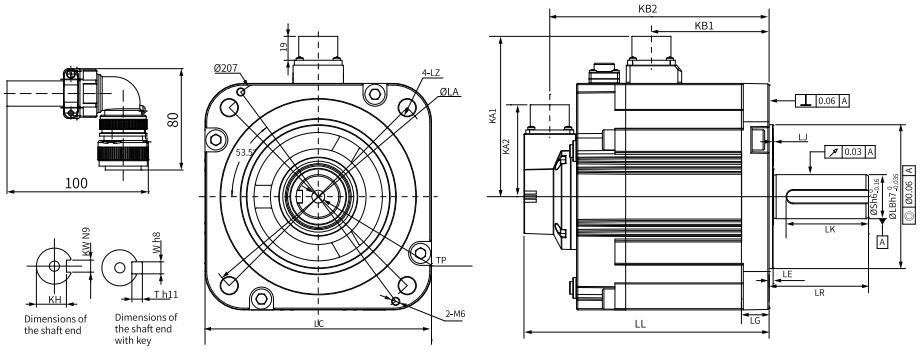
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	1470	490

Dimensions (mm)

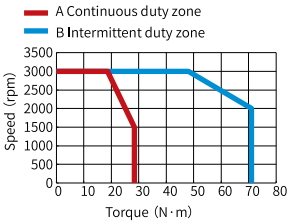


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	161 (194.8)	79±1	200	4-Ø13.5	127.4	93.5	74	140.5 (174.3)	22	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$		35	M12x25	65	30$^{0}_{-0.2}$	10	10	8	13.8 (17.9)

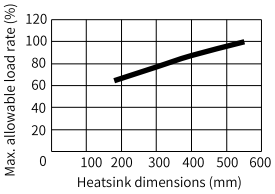
3.6.9 MS1H3-44C15CB-A33*R

Motor specifications		
Flange size (mm)	180	
Inertia, capacity	Medium inertia, medium capacity	
Rated power (kW)	4.4	
Voltage (V)	220	
Rated torque (N·m)	28.4	
Maximum torque (N·m)	71.1	
Rated current (Arms)	25.5	
Maximum current (Arms)	67	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.25	
Rotor moment of inertia (kg·cm^2)	Motor without brake	64.9
	Motor with brake	72.55

Torque-Speed characteristics



Heatsink-based derating curve



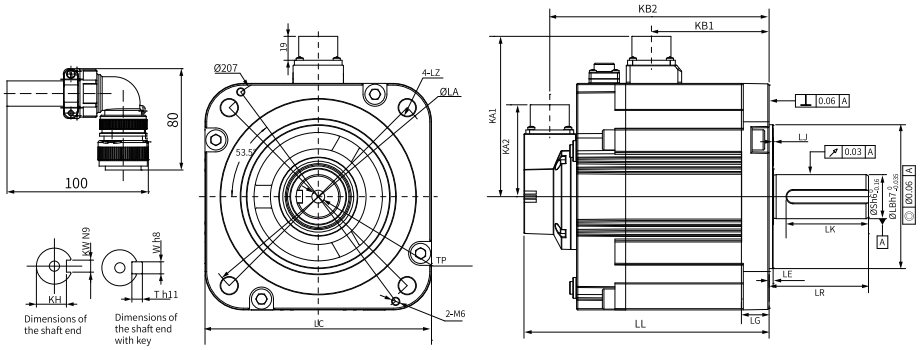
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

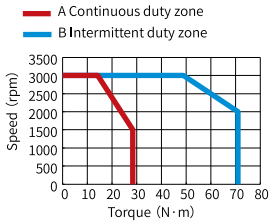
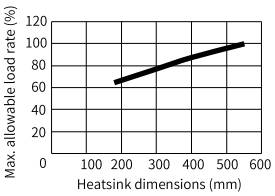
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	1470	490

Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2 [Note]	KB2	LG	LE
180	184.5 (218.3)	79±1	200	4-Ø13.5	127.4	117	73	164 (197.8)	22	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$		35	M12x25	65	30$^{0}_{-0.2}$	10	10	8	17.4 (21.9)

3.6.10 MS1H3-44C15CD-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	180		
Inertia, capacity	Medium inertia, medium capacity		
Rated power (kW)	4.4		
Voltage (V)	380		
Rated torque (N·m)	28.4		
Maximum torque (N·m)	71.1		
Rated current (Arms)	16		Heatsink-based derating curve
Maximum current (Arms)	42		
Rated speed (rpm)	1500		
Maximum speed (rpm)	3000		
Torque coefficient (N·m/Arms)	1.96		
Rotor moment of inertia (kg·cm^2)	Motor without brake	64.9	
	Motor with brake	72.55	

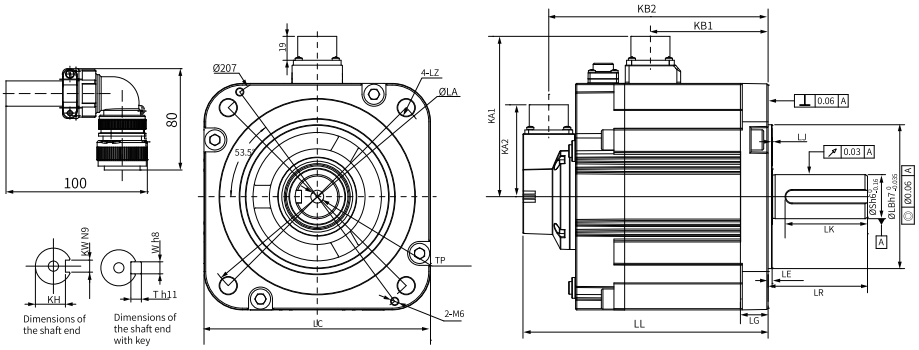
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
79	1470	490

Dimensions (mm)

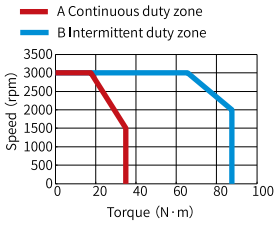


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	184.5 (218.3)	79±1	200	4-Ø13.5	127.4	117	74	164 (197.8)	22	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$		35	M12x25	65	30$^{0}_{-0.2}$	10	10	8	17.4 (21.6)

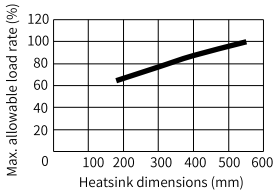
3.6.11 MS1H3-55C15CD-A33*R

Motor specifications		
Flange size (mm)	180	
Inertia, capacity	Medium inertia, medium capacity	
Rated power (kW)	5.5	
Voltage (V)	380	
Rated torque (N·m)	35	
Maximum torque (N·m)	87.6	
Rated current (Arms)	20.7	
Maximum current (Arms)	52	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.92	
Rotor moment of inertia (kg·cm^2)	Motor without brake	86.9
	Motor with brake	94.55

Torque-Speed characteristics



Heatsink-based derating curve



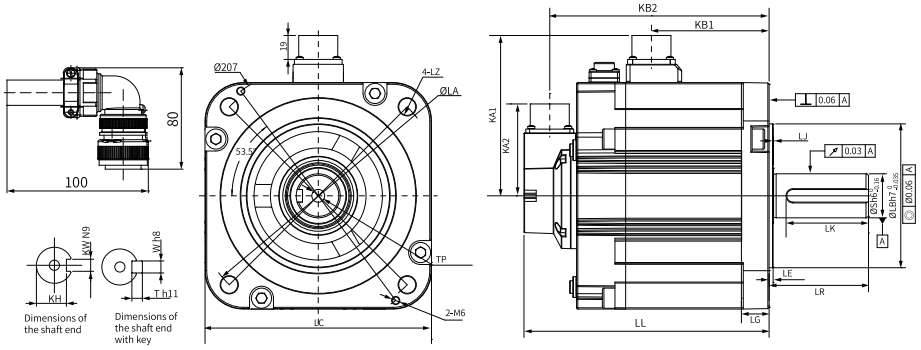
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	1764	588

Dimensions (mm)

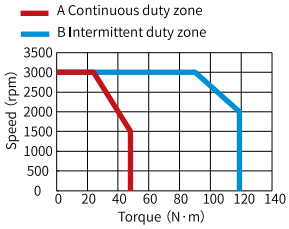


LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	208 (241.8)	113±1	200	4-Ø13.5	127.4	140.5	74	187.5 (221.3)	22	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$		42	M16x32	97	37$^{0}_{-0.2}$	12	12	8	21.7 (25.9)

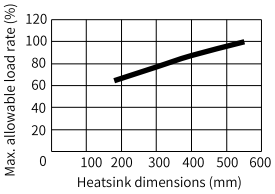
3.6.12 MS1H3-75C15CD-A33*R

Motor specifications		
Flange size (mm)	180	
Inertia, capacity	Medium inertia, medium capacity	
Rated power (kW)	7.5	
Voltage (V)	380	
Rated torque (N·m)	48	
Maximum torque (N·m)	119	
Rated current (Arms)	25	
Maximum current (Arms)	65	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	2.13	
Rotor moment of inertia (kg·cm^2)	Motor without brake	127.5
	Motor with brake	135.15

Torque-Speed characteristics



Heatsink-based derating curve



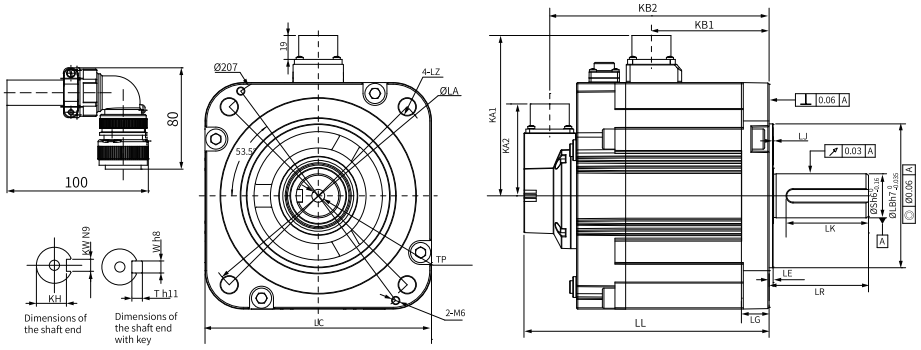
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	31	18.58	1.29	⩽ 200	⩽ 100	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
113	1764	588

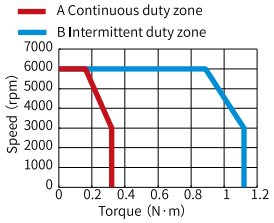
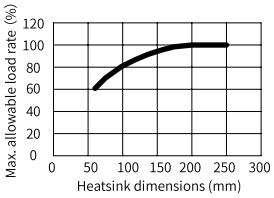
Dimensions (mm)



LC	LL	LR	LA	LZ	KA1	KB1	KA2	KB2	LG	LE
180	255 (288.8)	113±1	200	4-Ø13.5	127.4	187.5	74	234.5 (234.5)	22	3.2±0.3
LJ	LB		S	TP	LK	KH	KW	W	T	Weight (kg)
0.5±0.75	Ø114.3h7$^{0}_{-0.035}$		42	M16x32	97	37$^{0}_{-0.2}$	12	12	8	29 (33.2)

3.7 Motors with Medium Inertia and Small Capacity (MS1H4)

3.7.1 MS1H4-10B30CB-A33*Z

Motor specifications			Torque-Speed characteristics
Flange size (mm)	40		
Inertia, capacity	Low inertia, small capacity		
Rated output (kW)	0.1		
Voltage (V)	220		
Rated torque (N·m)	0.32		
Maximum torque (N·m)	1.12		
Rated current (Arms)	1.3		Heatsink-based derating curve
Maximum current (Arms)	4.70		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.26		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.102	
	Motor with brake	0.104	

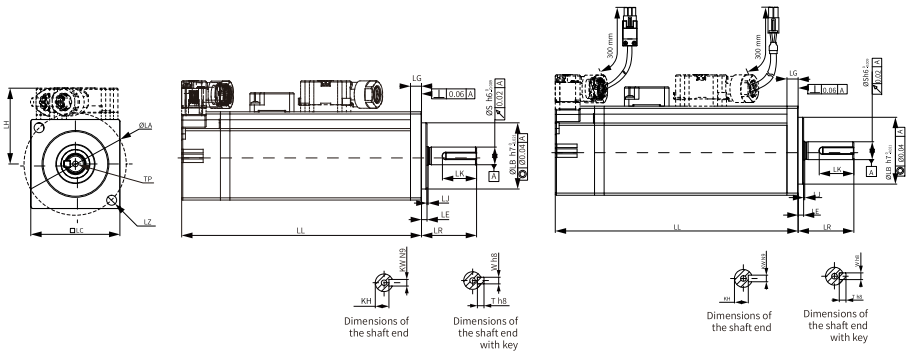
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.1	94.4	0.25	⩽ 40	⩽ 20	⩽ 1.5

Allowable load

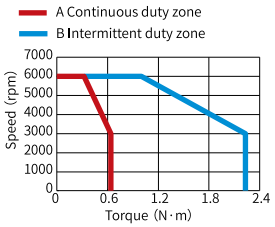
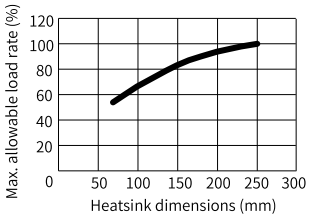
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
20	78	54

Dimensions (mm)



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
91 (121.5)	40	25±0.5	46	2-Ø4.5	34.3	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	Ø30h7$^{0}_{-0.021}$	M3x6	15.5	6.2$^{0}_{-0.1}$	3	3	3	0.45 (0.64)

3.7.2 MS1H4-20B30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	60		
Inertia, capacity	Medium inertia, low capacity		
Rated power (kW)	0.2		
Voltage (V)	220		
Rated torque (N·m)	0.64		
Maximum torque (N·m)	2.24		
Rated current (Arms)	1.3		Heatsink-based derating curve
Maximum current (Arms)	5.3		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.46		
Rotor moment of inertia (kg·cm^2)	Motor without brake	0.22	
	Motor with brake	0.23	

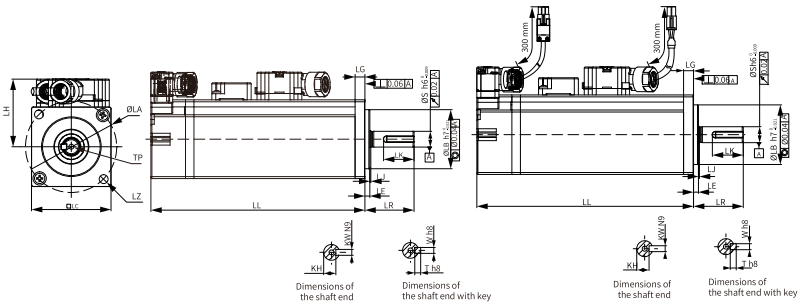
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	⩽ 60	⩽ 20	⩽ 1.5

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	245	74

Dimensions (mm)

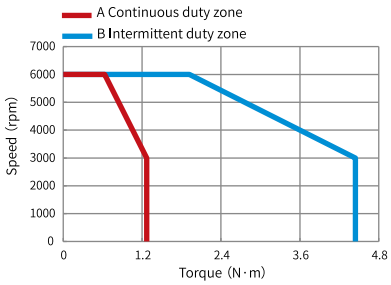


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
60	73.5 (101.1)	30±0.5	70	4-Ø5.5	44	8.0	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø50h7$^{0}_{-0.025}$	14	M5x8	16.5	11$^{0}_{-0.1}$	5	5	5	0.78 (1.16)

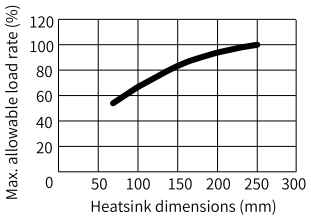
3.7.3 MS1H4-40B30CB-A33*R

Motor specifications		
Flange size (mm)	60	
Inertia, capacity	Medium inertia, low capacity	
Rated power (kW)	0.4	
Voltage (V)	220	
Rated torque (N·m)	1.27	
Maximum torque (N·m)	4.45	
Rated current (Arms)	2.4	
Maximum current (Arms)	9.2	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.53	
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	0.43
	Motor with brake	0.44

Torque-Speed characteristics



Heatsink-based derating curve



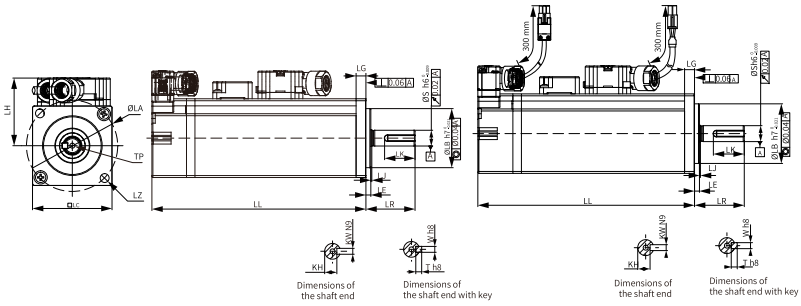
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	⩽ 60	⩽ 20	⩽ 1.5

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
25	245	74

Dimensions (mm)

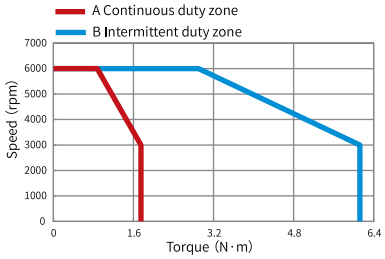


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
60	92 (119.8)	30±0.5	70	4-Ø5.5	44	8.0	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø50h7$^{0}_{-0.025}$	14	M5x8	16.5	11$^{0}_{-0.1}$	5	5	5	1.11 (1.48)

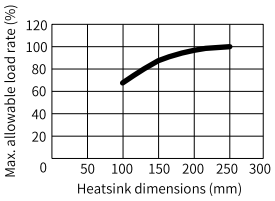
3.7.4 MS1H4-55B30CB-A331R

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Medium inertia, low capacity	
Rated power (kW)	0.55	
Voltage (V)	220	
Rated torque (N·m)	1.75	
Maximum torque (N·m)	6.13	
Rated current (Arms)	3.3	
Maximum current (Arms)	13.2	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.49	
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.12
	Motor with brake	-

Torque-Speed characteristics



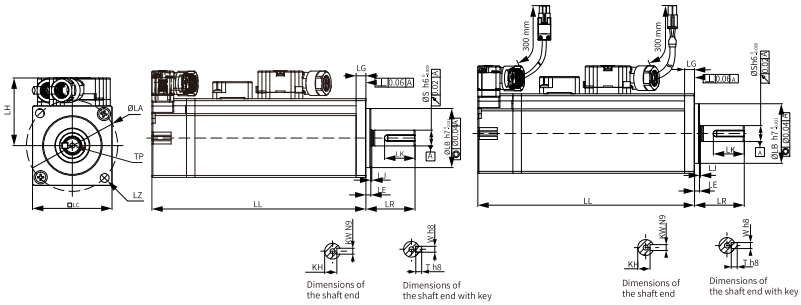
Heatsink-based derating curve



Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

Dimensions (mm)

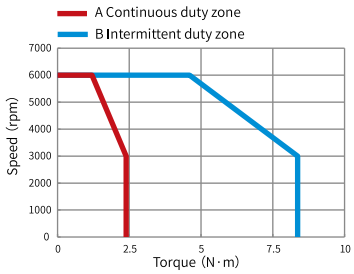


LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	96.7	25±0.5	90	4- Ø 7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø70h7$^{0}_{-0.03}$	19	M6 x 20	26	15.5$^{0}_{-0.1}$	6	6	6	1.85

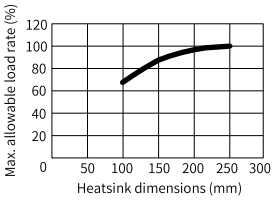
3.7.5 MS1H4-75B30CB-A33*R

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Medium inertia, low capacity	
Rated power (kW)	0.75	
Voltage (V)	220	
Rated torque (N·m)	2.39	
Maximum torque (N·m)	8.37	
Rated current (Arms)	4.4	
Maximum current (Arms)	16.9	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.58	
Rotor moment of inertia ($kg \cdot cm^2$)	Motor without brake	1.46
	Motor with brake	1.51

Torque-Speed characteristics



Heatsink-based derating curve



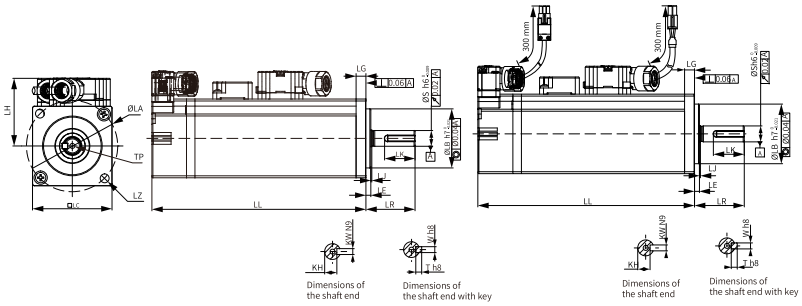
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	⩽ 60	⩽ 40	⩽ 1

Allowable load

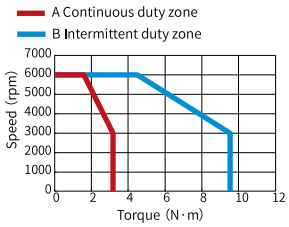
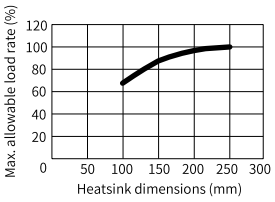
LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	107.3 (140.5)	25±0.5	90	4-Ø7	54	7.5	3±0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø70h7$^{0}_{-0.03}$	19	M6 × 20	26	15.5$^{0}_{-0.1}$	6	6	6	2.18 (2.82)

3.7.6 MS1H4-10C30CB-A33*R

Motor specifications			Torque-Speed characteristics
Flange size (mm)	80		
Inertia, capacity	Medium inertia, low capacity		
Rated power (kW)	1.0		
Voltage (V)	220		
Rated torque (N·m)	3.18		
Maximum torque (N·m)	11.13		
Rated current (Arms)	6.5		Heatsink-based derating curve
Maximum current (Arms)	24		
Rated speed (rpm)	3000		
Maximum speed (rpm)	6000		
Torque coefficient (N·m/Arms)	0.46		
Rotor moment of inertia (kg·cm^2)	Motor without brake	1.87	
	Motor with brake	1.97	

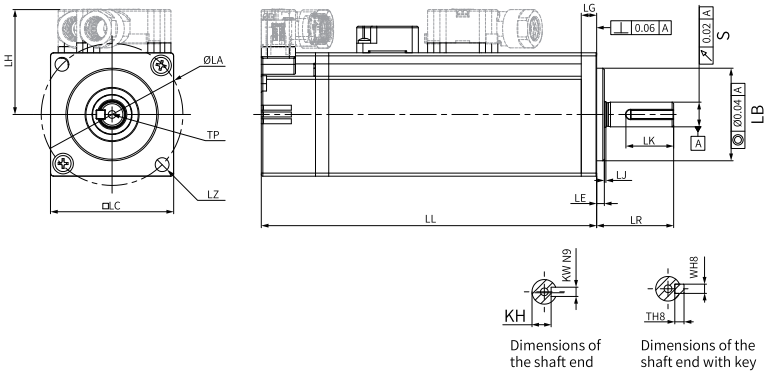
Electrical specifications of the motor with brake

Holding torque (N·m)	Supply voltage (VDC)±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	⩽ 60	⩽ 40	⩽ 1

Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
35	392	147

Dimensions (mm)



LC	LL	LR	LA	LZ	LH	LG	LE	LJ
80	118.7 (153.2)	25±0.5	90	4-Ø7	54	7.5	3 ± 0.5	0.5±0.35
LB	S	TP	LK	KH	KW	W	T	Weight (kg)
Ø70h7$^{0}_{-0.03}$	19	M6 x 20	26	15.5$^{0}_{-0.1}$	6	6	6	2.55 (2.9)

4 Optional parts

4.1 List of Optional Parts

Type	Name	Location	Applicable Model	Description
Peripheral components	Fuse and circuit breaker	Input side of the servo drive	All	To comply with EN 61800-5-1 and UL61800-5-1 standards, install a fuse/circuit breaker on the input side of the servo drive to prevent accidents caused by short circuit in the internal circuit.
	AC Input Reactor	Input side of the servo drive		Eliminates harmonics on the input side and improves the power factor on the input side.
	EMC filter	Input side of the servo drive		Reduces the conducted and radiated interference escaped from the servo drive to the outside.
	Magnetic ring	Output side of the servo drive		Reduces interferences to the outside and the bearing current.
		Signal cable		Improves the anti-interference performance of signals.

4.2 Cables

4.2.1 Model Description

Power cable

S6-L-M ① 0 ② 0 ③ 0 ④ - 3.0 ⑤ – T ⑥

① **Cable type** S6-L-B/M: Motion control power cable B: With brake M: Without brake	③ **Cross sectional area (mm²)** 0: Flange size 25/40/60/80 1: Flange size 100/130/180 (drive rated current < 13 A) 2: Flange size 180 (rated current of the drive > 13 A)	⑤ **Cable length (m)** 3.0: 3 m 5.0: 5 m 10.0: 10 m
② **Connector type at drive side** 0: U-shaped cable lug 1: Pin-shaped cable lug	④ **Connector type at motor side** 0: 6-core plastic connector 1: 9-core aviation connector 2: 6-core aviation connector 7: SDC-06T series aviation connector (front outlet) 8: SDC-06T series aviation connector (rear outlet)	⑥ **Special requirements** T: Drag chain TS: Shielded flexible cable

Model number of encoder cables

S6-L-P ① 0 ② 0 ③ 0 ④ - 3.0 ⑤ - T ⑥

① **Cable type** S6-L-P: Motion control encoder cable	③ **Encode** 1: Communication incremental encoder	⑤ **Cable length (m)** 3.0: 3 m 5.0: 5 m 10.0: 10 m
② **Connector type at drive side** 0: DB9 1: USB	④ **Connector type at motor side** 0: 9-core plastic connector 1: 9-core aviation connector 4: SDC-06T series aviation connector (front outlet) 5: SDC-06T series aviation connector (rear outlet)	⑥ **Special requirements** T: Drag chain TS: Shielded flexible cable

Model number of communication cables

S6N-L-T ① 00 ② - 3.0 ③

① **Cable type** S6-L-T: Motion control communication cable S6N-L-T: IS620F motion control encoder cable (only for servo drive PC communication cable)	② **Cable type** 00: Servo drive PC communication cable 01: Servo drive network communication cable (CAN&RS485) 02: Servo drive and PLC communication cable 03: Servo drive termination resistor cable 04: Servo drive network communication cable (EtherCAT)	③ **Cable length (m)** 3.0: 3 m 5.0: 5 m 10.0: 10 m

4.2.2 Cable Type

Regular cables

Do not bend or move regular cables during use. Bending or moving regular cables may damage the cables and lead to a series of cable-related faults such as poor contact. Secure regular cables by binding them with ties or similar. During binding, reserve certain bending radius for the cables to prevent stress.

Flexible cables

Flexible cables can move along with the drag chain without a high risk of abrasion.

Note

- Do not twist cables inside the cable carrier.
- Ensure the cable can move within the bending radius. Do not move the cables by force. Ensure a relative movement between cables or between the cable and the guiding device is available.
- Do not fix or bundle the cables inside the cable carrier. The cables can be bundled and fixed only at two unmovable ends of the cable carrier.

Oil-resistant cables

Oil-resistant cables apply to applications requiring shielded power cables, such as machine tools, cutting fluids, and cutting compounds.

Note

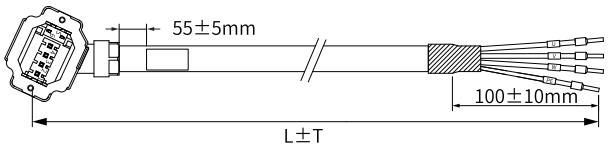
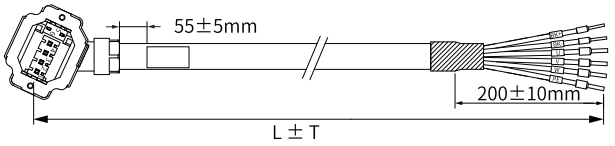
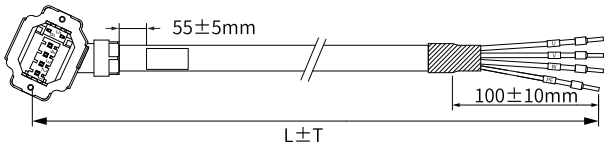
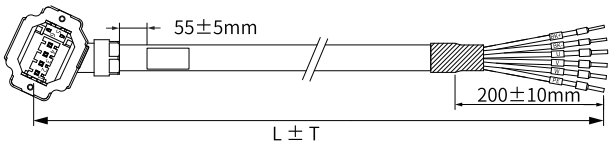
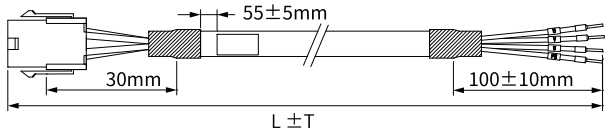
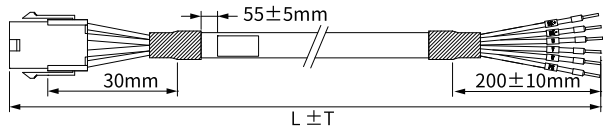
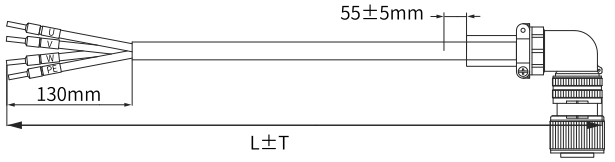
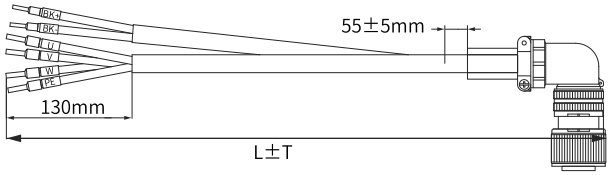
- For motors with terminal box, if the encoder cable is longer than 25 m, S6-C24 cable kit is required. Contact Inovance sales staff for details on the cable length.
- For motors with flying leads, contact Inovance sales staff for encoder cables longer than 25 m.

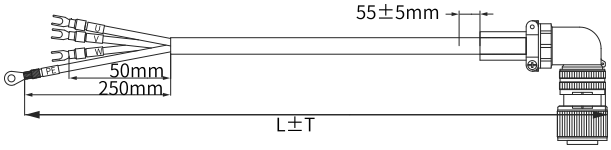
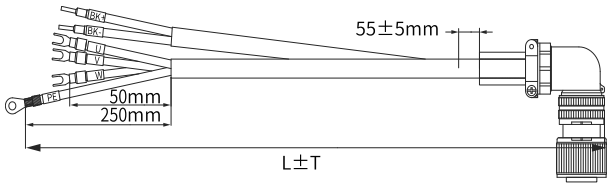
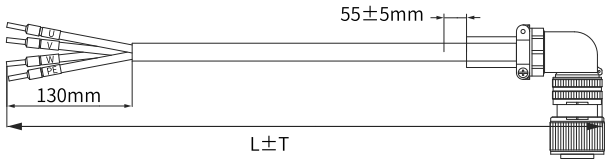
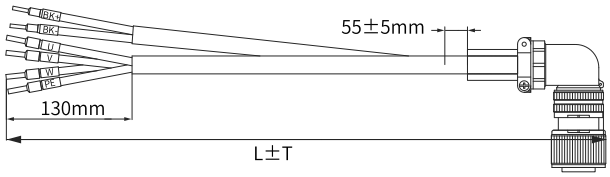
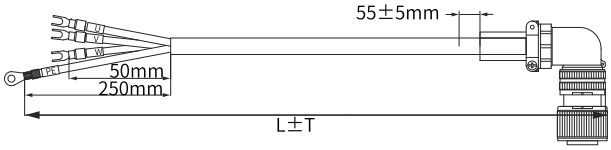
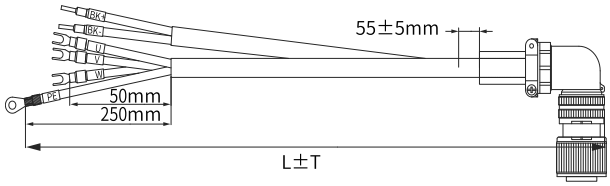
More information

For more cable information, see "Cable Specifications and Models" in the hardware manual for the servo drive.

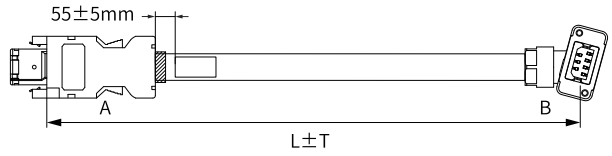
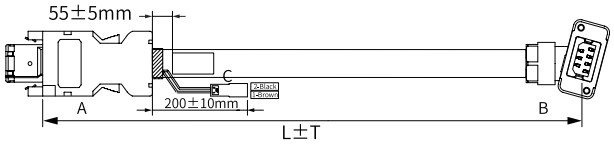
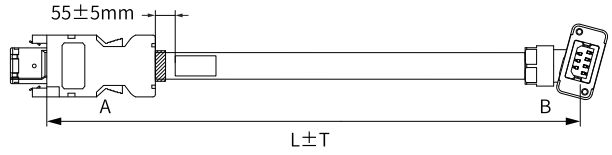
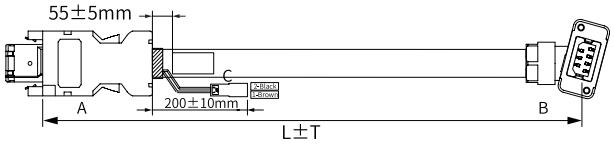
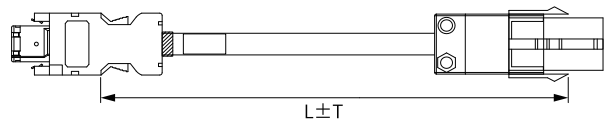
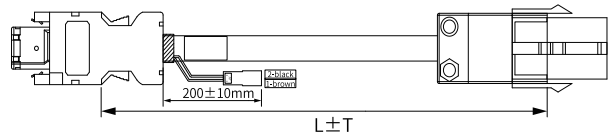
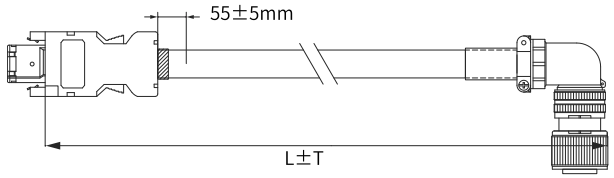
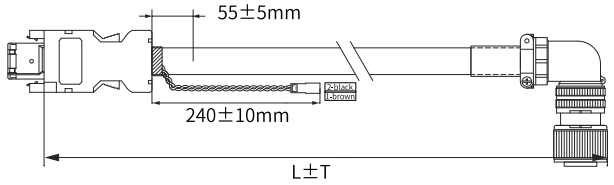
4.2.3 Cable Selection

Power cable

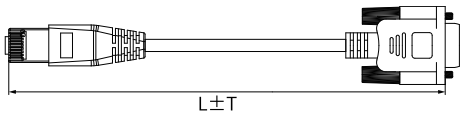
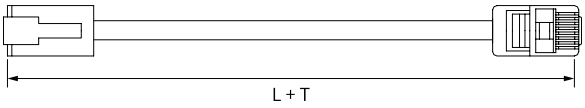
Motor Model	Cable Name		Cable Model	L Cable Length (mm)	Tolerance (T) (mm)	Illustration
MS1H1/ MS1H4 terminal-type motor	Front outlet	Power cable for motor without brake	S6-L-M107-3.0	3000	(-30.30)	
			S6-L-M107-5.0	5000	(-30.50)	
			S6-L-M107-10.0	10000	(-30.80)	
		Brake	S6-L-B107-3.0	3000	(-30.30)	
			S6-L-B107-5.0	5000	(-30.50)	
			S6-L-B107-10.0	10000	(-30.80)	
	Rear outlet	Power cable for motor without brake	S6-L-M108-3.0	3000	(-30.30)	
			S6-L-M108-5.0	5000	(-30.50)	
			S6-L-M108-10.0	10000	(-30.80)	
		Brake	S6-L-B108-3.0	3000	(-30.30)	
			S6-L-B108-5.0	5000	(-30.50)	
			S6-L-B108-10.0	10000	(-30.80)	
MS1H1/ MS1H4 flying leads type (Z-S) motor	Power cable for motor without brake		S6-L-M100-3.0	3000	(-30.30)	
			S6-L-M100-5.0	5000	(-30.50)	
			S6-L-M100-10.0	10000	(-30.80)	
	Brake		S6-L-B100-3.0	3000	(-30.30)	
			S6-L-B100-5.0	5000	(-30.50)	
			S6-L-B100-10.0	10000	(-30.80)	
MS1H2 motor rated 3 kW or below/ MS1H3 motor rated 1.8 kW or below	Power cable for motor without brake		S6-L-M111-3.0	3000	(-30.30)	
			S6-L-M111-5.0	5000	(-30.50)	
			S6-L-M111-10.0	10000	(-30.80)	
	Brake		S6-L-B111-3.0	3000	(-30.30)	
			S6-L-B111-5.0	5000	(-30.50)	
			S6-L-B111-10.0	10000	(-30.80)	

Motor Model	Cable Name	Cable Model	L Cable Length (mm)	Tolerance (T) (mm)	Illustration
MS1H2 motor rated 4 kW/5 kW	Power cable for motor without brake	S6-L-M011-3.0	3000	(-30.30)	
		S6-L-M011-5.0	5000	(-30.50)	
		S6-L-M011-10.0	10000	(-30.80)	
	Brake	S6-L-B011-3.0	3000	(-30.30)	
		S6-L-B011-5.0	5000	(-30.50)	
		S6-L-B011-10.0	10000	(-30.80)	
MS1H3 motor rated 2.9 kW	Power cable for motor without brake	S6-L-M112-3.0	3000	(-30.30)	
		S6-L-M112-5.0	5000	(-30.50)	
		S6-L-M112-10.0	10000	(-30.80)	
	Brake	S6-L-B112-3.0	3000	(-30.30)	
		S6-L-B112-5.0	5000	(-30.50)	
		S6-L-B112-10.0	10000	(-30.80)	
MS1H3 motor rated 4.4 kW or above	Power cable for motor without brake	S6-L-M022-3.0	3000	(-30.30)	
		S6-L-M022-5.0	5000	(-30.50)	
		S6-L-M022-10.0	10000	(-30.80)	
	Brake	S6-L-B022-3.0	3000	(-30.30)	
		S6-L-B022-5.0	5000	(-30.50)	
		S6-L-B022-10.0	10000	(-30.80)	

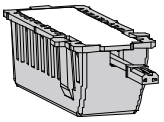
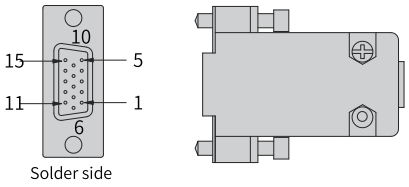
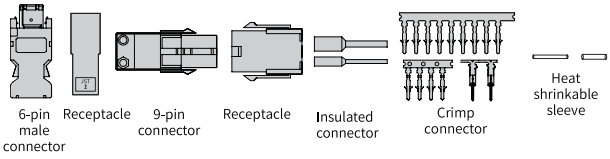
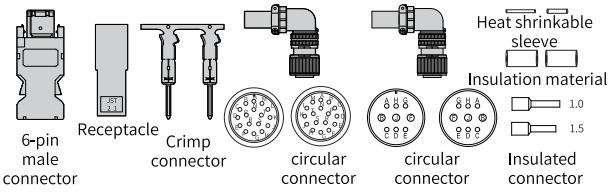
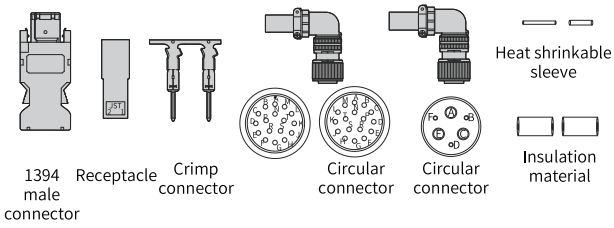
Encoder cable

Motor Model	Cable Name		Cable Model	L Cable Length (mm)	Tolerance (T) (mm)	Illustration
MS1H1/ MS1H4 terminal-type (Z) motor	Front outlet	Single-turn absolute encoder cable	S6-L-P114-3.0	3000	(-30.30)	
			S6-L-P114-5.0	5000	(-30.50)	
			S6-L-P114-10.0	10000	(-30.80)	
		Multi-turn absolute encoder cable	S6-L-P124-3.0	3000	(-30.30)	
			S6-L-P124-5.0	5000	(-30.50)	
			S6-L-P124-10.0	10000	(-30.80)	
	Rear outlet	Single-turn absolute encoder cable	S6-L-P115-3.0	3000	(-30.30)	
			S6-L-P115-5.0	5000	(-30.50)	
			S6-L-P115-10.0	10000	(-30.80)	
		Multi-turn absolute encoder cable	S6-L-P125-3.0	3000	(-30.30)	
			S6-L-P125-5.0	5000	(-30.50)	
			S6-L-P125-10.0	10000	(-30.80)	
MS1H1/MS1H4 flying leads type (Z-S) motor		Single-turn absolute encoder cable	S6-L-P110-3.0	3000	(-30.30)	
			S6-L-P110-5.0	5000	(-30.50)	
			S6-L-P110-10.0	10000	(-30.80)	
		Multi-turn absolute encoder cable	S6-L-P120-3.0	3000	(-30.30)	
			S6-L-P120-5.0	5000	(-30.50)	
			S6-L-P120-10.0	10000	(-30.80)	
MS1H2/MS1H3 motor		Single-turn absolute encoder cable	S6-L-P111-3.0	3000	(-30.30)	
			S6-L-P111-5.0	5000	(-30.50)	
			S6-L-P111-10.0	10000	(-30.80)	
		Multi-turn absolute encoder cable	S6-L-P121-3.0	3000	(-30.30)	
			S6-L-P121-5.0	5000	(-30.50)	
			S6-L-P121-10.0	10000	(-30.80)	

Communication cables

Cable Name	Cable Model	Cable Length (mm)	Tolerance (T) (mm)	Illustration
Drive-PC communication cable	S6-L-T00-3.0	3000	(-30.30)	
Multi-drive communication cable	S6-L-T04-0.3	300	(-20.20)	
Servo Drive to PLC Communication Cable	S6-L-T04-3.0	3000	(-30.30)	

Connector Kit

Name	Model	Outline Drawing
Battery kit	S6-C4A	
CN1 terminal (DB15)	S6-C6	
MS1H1 flying leads type (Z-S) motor connector	S6-C26	
MS1H2/MS1H3 (1.8 kW and below) motor connector	S6-C29	
MS1H3 (2.9 kW and above) motor connector	S6-C39	

4.3 Peripheral Electrical Components

4.3.1 Breaker

Table 4–1 Recommended circuit breaker models

Size	Drive Model SV660F****I	Rated Input Current (A)	Recommended Circuit Breaker		
			Manufacturer	Current (A)	Model
Single-phase 220 V					
A	S1R6	2.3	Schneider	4	OSMC32N2C4
	S2R8	4		6	OSMC32N2C6
B	S5R5	7.9		16	OSMC32N2C16
C	S7R6	9.6		16	OSMC32N2C16
D	S012	12.8		20	OSMC32N2C20
Three-phase 220 V					
C	S7R6	5.1	Schneider	10	OSMC32N2C10
D	S012	8		16	OSMC32N2C16
Three-phase 380 V					
C	T3R5	2.4	Schneider	4	OSMC32N2C4
	T5R4	3.6		6	OSMC32N2C6
D	T8R4	5.6		10	OSMC32N2C10
	T012	8		16	OSMC32N2C16
E	T017	12		20	OSMC32N2C20
	T021	16		25	OSMC32N2C25
	T026	21		32	OSMC32N2C32

Note

For UL-compliant products, see section "UL/cUL Certification" in SV660F Series Servo Drive Hardware Guide for recommended fuse/circuit breaker models.

If a residual current device (RCD) is needed, select the RCD according to the following requirements:

- Use a B-type RCD because the drive may generate DC leakage current in the protective conductor.
- For each drive, use an RCD whose tripping current is not lower than 100 mA to prevent RCD malfunction due to high-frequency leakage current generated by the drive.
- When multiple drives are connected in parallel and share one RCD, select an RCD whose tripping current is not lower than 300 mA.
- Use Chint or Schneider RCDs (recommended).

4.3.2 Fuse

To prevent accidents caused by short circuit, install a fuse on the input side of the drive.

Table 4–2 List of recommended fuses

Size	Drive Model SV660F****I	Rated Input Current (A)	Recommended Fuse		
			Manufacturer	Rated Current (A)	Model
Single-phase 220 V					
A	S1R6	2.3	Bussmann	15	FWP-15B
	S2R8	4		20	FWP-20B
B	S5R5	7.9		35	FWP-35C
C	S7R6	9.6		40	FWP-40C
D	S012	12.8		40	FWP-40C
Three-phase 220 V					
C	S7R6	5.1	Bussmann	50	FWP-50C
D	S012	8		50	FWP-50C
Three-phase 380 V					
C	T3R5	2.4	Bussmann	15	FWP-15B
	T5R4	3.6		20	FWP-20B
D	T8R4	5.6		20	FWP-20B
	T012	8		50	FWP-50C
E	T017	12		50	FWP-50C
	T021	16		70	FWP-70C
	T026	21		125	FWP-125C

4.3.3 Electromagnetic Contactor

Table 4–3 Recommended electromagnetic contactor models

Size	Drive Model SV660F****I	Rated Input Current	Recommended contactor		
			Manufacturer	Current (A)	Model
Single-phase 220 V					
A	S1R6	2.3	Schneider	9	LC1 D09
	S2R8	4		9	LC1 D09
B	S5R5	7.9		9	LC1 D09
C	S7R6	9.6		12	LC1 D12
D	S012	12.8		18	LC1 D18
Three-phase 220 V					
C	S7R6	5.1	Schneider	9	LC1 D09
D	S012	8		9	LC1 D09
Three-phase 380 V					
C	T3R5	2.4	Schneider	9	LC1 D09
	T5R4	3.6		9	LC1 D09
D	T8R4	5.6		9	LC1 D09
	T012	8		9	LC1 D09
E	T017	12		12	LC1 D12
	T021	16		18	LC1 D18
	T026	21		25	LC1 D25

4.3.4 AC Input Reactor

Model selection

An AC input reactor is optional and mainly used to reduce harmonics in the input current. Install an external reactor as needed in actual applications. The following table lists the recommended manufacturers and models of input reactors.

Table 4–4 AC input reactor model selection

Size	Drive Model SV660F****I	Rated Input Current	Applicable Reactor	Inductance (mH)
Three-phase 220 V				
C	S7R6	5.1	MD-ACL-10-5-4T	5
D	S012	8	MD-ACL-10-5-4T	5
Three-phase 380 V				
C	T3R5	2.4	MD-ACL-10-5-4T	5
	T5R4	3.6	MD-ACL-10-5-4T	5
D	T8R4	5.6	MD-ACL-10-5-4T	5
	T012	8	MD-ACL-10-5-4T	5
E	T017	12	MD-ACL-15-3-4T	3
	T021	16	MD-ACL-40-1.45-4T	1.45
	T026	21	MD-ACL-40-1.45-4T	1.45

Dimensions

- Inovance input reactors

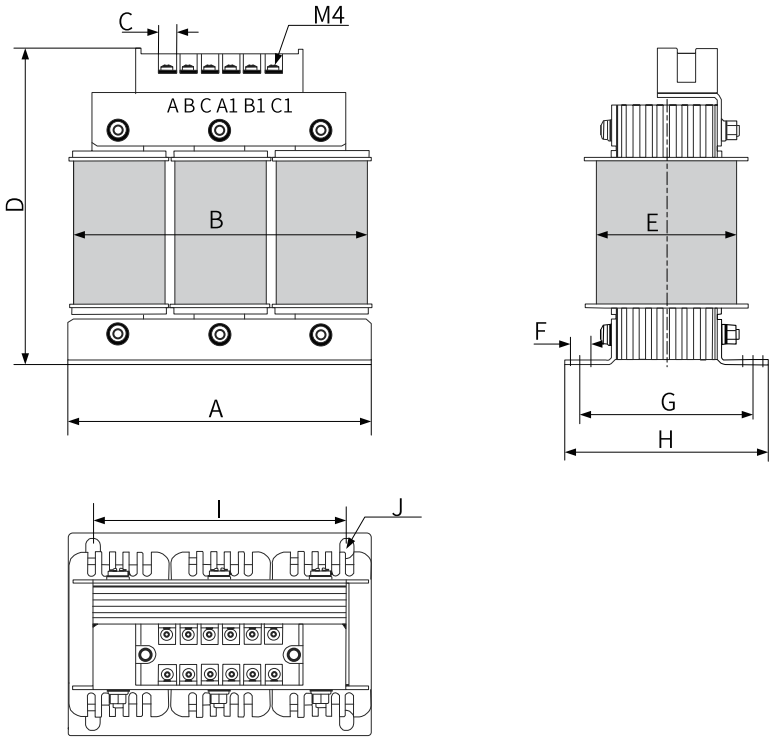


Figure 4-1 Dimensions of 10 A to 15 A AC input reactors

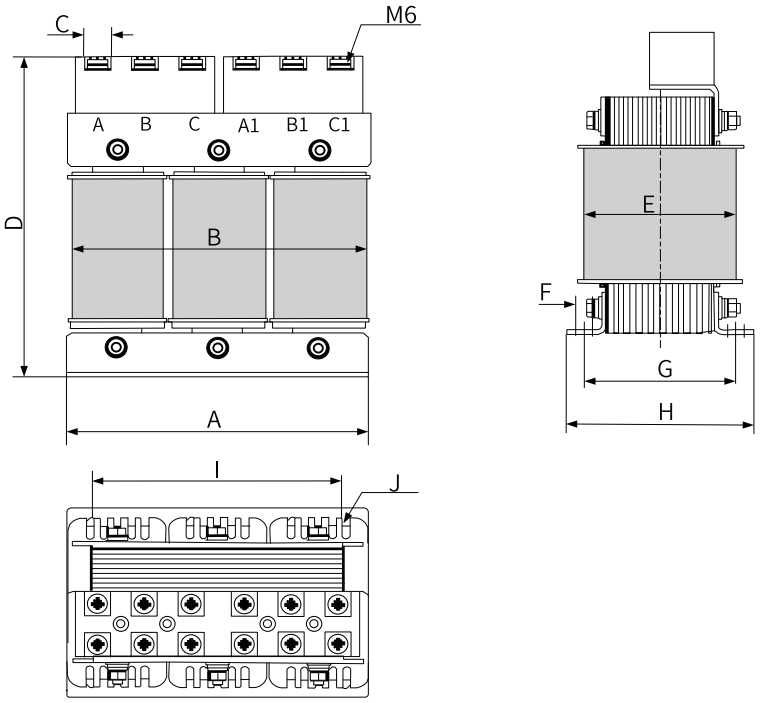


Figure 4-2 Dimensions of 40 A (1.45 mH) AC input reactors

Table 4–5 Dimensions of Inovance AC input reactors (unit: mm)

Model	A	B	C	D	E	F	G	H	I	J
MD-ACL-10-5-4T	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7 x 10
MD-ACL-15-3-4T	150±2	155	8	160	80	10	85±2	100±2	125±1	Φ7 x 10
MD-ACL-40-1.45-4T	180±2	185	16	200	105	10	95±2	117±2	150±1	Φ7 x 10

4.3.5 AC Input Reactor

Selection

The DC input reactor, which is an optional part, is mainly used to reduce current ripple in a DC circuit and increase the power factor. *"Table 4–6" on page 86* lists the recommended manufacturers and models.

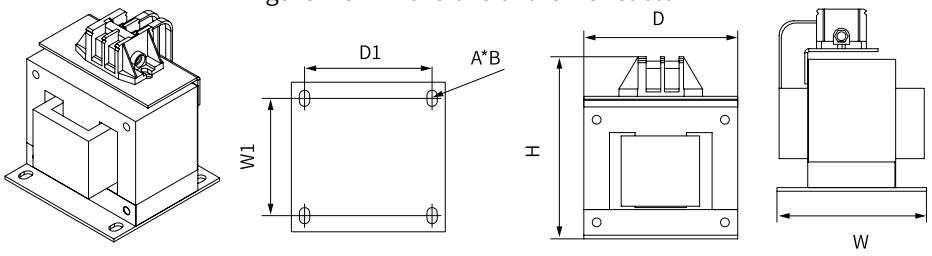
Table 4–6 Selection of DC input reactor

Size	Drive Model	Rated Input Current (A)	Applicable Reactor	Inductance (mH)
E	T017	12	DCL-0023-EIDH-E3M6	3.6
	T021	16	DCL-0023-EIDH-E3M6	3.6
	T026	21	DCL-0023-EIDH-E3M6	3.6

Dimensions

DC reactor:

Figure 4-3 Dimensions of the DC reactor



Model	D*h*W (mm)	D1 x W1 (mm)	A*B (mm)	Material	Weight (kg)
DCL-0023-EIDH-E3M6	110 x 135 x 120	87 x 70	6 x 11	AL	3.8

4.3.6 EMC Filter

Selection

To comply with EN IEC 61800-3 requirements in terms of radiated and conducted emission, install an EMC filter listed in the following table. EMC filter options are FN 2090 and FN 3287 series EMC filters manufactured by Schaffner. Select the EMC filter according to the rated input current of the servo drive, as shown in the following table.

Table 4–7 Standard EMC filter model and appearance

Filter Model		Appearance
Schaffner	FN 2090 series	
	FN 3287 series	

Table 4–8 Filter model selection (Schaffner)

Size	Servo drive model SV660F****I	Rated Input Current	Applicable Filter
Single-phase 220 V			
A	S1R6	2.3	FN 2090-3-06
	S2R8	4	FN 2090-4-06
B	S5R5	7.9	FN 2090-8-06
C	S7R6	9.6	FN 2090-10-06
D	S012	12.8	FN 2090-16-06

Size	Servo drive model SV660F****I	Rated Input Current	Applicable Filter
Single-phase 220 V			
Three-phase 220 V			
C	S7R6	5.1	FN 3287-10-44-C28-R65
D	S012	8	FN 3287-10-44-C28-R65
Three-phase 380 V			
C	T3R5	2.4	FN 3287-10-44-C28-R65
	T5R4	3.6	FN 3287-10-44-C28-R65
D	T8R4	5.6	FN 3287-10-44-C28-R65
	T012	8	FN 3287-10-44-C28-R65
E	T017	12	FN 3287-16-44-C33-R65
	T021	16	FN 3287-16-44-C33-R65
	T026	21	FN 3287-16-44-C33-R65

Dimensions

- Dimensions of Schaffner FN 2090 series filters

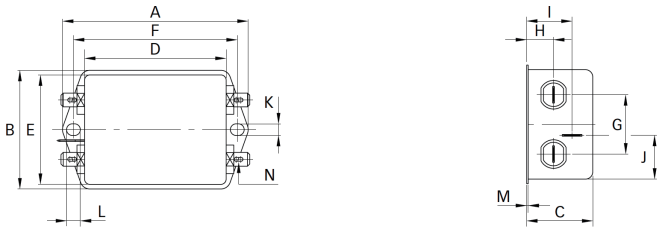


Figure 4-4 Dimensions of FN 2090 series filters (unit: mm)

Table 4–9 Dimensions of FN 2090 series filters (unit: mm)

Rated current (A)	A	B	C	D	E	F	G	H	I	J	K	L	M	N
3	85	54	30.3	64.8	49.8	75	27	12.3	20.8	19.9	5.3	6.3	0.7	6.3 x 0.8
4														
6														
8	113.5±1	57.5±1	45.4±1	94±1	56	103	25	12.4	32.4	15.5	4.4	6	1	6.3 x 0.8

- Dimensions of Schaffner FN 3287 series filters

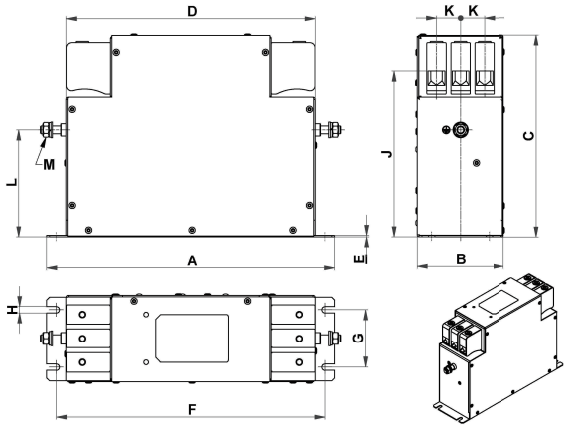


Figure 4-5 Dimensions of FN3287 filters (in mm)

Table 4–10 Dimensions of FN3287 filters (in mm)

Rated current (A)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J1+/-2 (mm)	K	L+/-1 (mm)	M**
10	180	40	112	153	0.8	170	20	4.5	94	11	68	M5
16	200	45	112	170	0.8	185	25	5.4	102	11	76	M5
25	205	45	132	173	0.8	190	25	5.4	113	13	83	M5

4.3.7 Magnetic Ring and Magnetic Buckle

The magnetic ring is intended to be installed on the input or output side of the drive. Install the magnetic ring as close to the drive as possible. Installing the magnetic ring on the input side suppresses the noise in the input power supply system of the drive. When it is installed on the output side, it can reduce the interference generated by the drive to external devices and the bearing current.

In applications with leakage current and signal cable interference, install a magnetic ring or a ferrite clamp.

Selection

- Amorphous magnetic ring: featuring a high permeability within 1 MHz and excellent anti-interference performance, but not as low-cost as the ferrite clamp. See for details. *“ Dimensions” on page 90*
- Ferrite clamp: featuring a good interference suppression performance within a frequency band above 1MHz, applicable to low-power servo drives and signal cables, low-cost and easy to install

Magnetic ring and ferrite clamp		Appearance
Magnetic ring	DY644020H	
	DY805020H	
ferrite clamp	DYR-130-B	

Dimensions

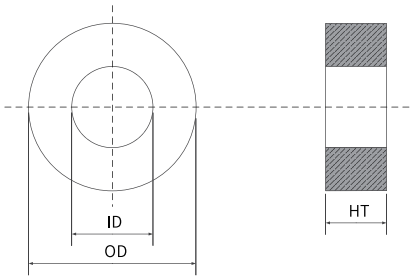


Figure 4-6 Dimensions of the magnetic ring

Table 4–11 Dimensions of the magnetic ring

Model	Size (OD×ID×HT) (mm)
DY644020H	64 × 40× 20
DY805020H	80 × 50× 20

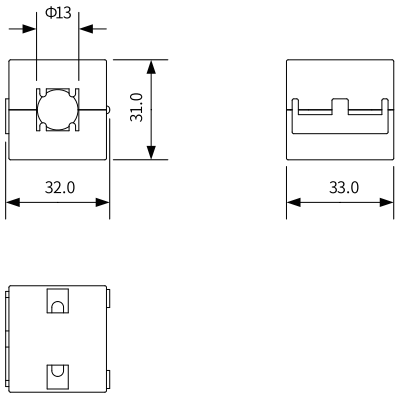


Figure 4-7 Dimensions of the ferrite clamp

Table 4–12 Dimensions of the ferrite clamp

Model	Size (Length × OD × ID) (mm)
DYR-130-B	32.0 × 31× 13

4.4 Absolute Encoder Batteries

Model selection

Select an appropriate battery according to the following table.

Table 4–13 Description of the absolute encoder battery

Battery Specifications	Item	Rated Values			Condition
		Min. Value	Typical Value	Max. Value	
Output: 3.6 V, 2500 mAh	External battery voltage (V)	3.2	3.6	5	In standby state[1]
	Circuit fault voltage (V)	-	2.6	-	In standby state
	Battery alarm voltage (V)	2.85	3	3.15	-
	Current consumed by the circuit (uA)	-	2	-	In normal operation[2]
		-	10	-	In standby state, shaft at standstill
		-	80	-	In standby state, shaft rotating
	Ambient temperature (°C)	0	-	40	Same as the motor.
	Storage temperature (°C)	-20	-	60	

The preceding values are obtained under an ambient temperature of 20°C.

Note

- [1]: The "standby state" means the encoder counts the multi-turn data by using the power from the external battery when the servo drive power supply is not switched on. In this case, data transceiving stops.
- [2]: During normal operation, the absolute encoder supports one-turn or multi-turn data counting and transceiving. Power on the servo drive after connecting the absolute encoder properly. The encoder starts data transceiving after a short delay of about 5s upon power-on. The motor speed must be lower than or equal to 10 rpm during transition from the standby state to the normal operation state (upon power-on). Otherwise, Er.740 (Encoder fault) may occur. In this case, you need to power off and on the servo drive again.

Design life of the battery

The following calculation only covers the current consumed by the encoder.

Assume that the drive works normally for T1 in a day, the motor rotates for T2 after the drive is powered off, and the motor stops rotating for T3 after power-off [unit: hour (H)].

Example:

Table 4–14 Design life of the absolute encoder battery

Item	Schedule 1	Schedule 2
Working Days in Different Operating Conditions in 1 Year	313	52
T1 (h)	8	0
T2 (h)	0.1	0
T3 (h)	15.9	24

Capacity consumed in 1 year = (8 h × 2 uA + 0.1 h × 80 uA + 15.9 h × 10 uA) x 313 + (0 h × 2 uA + 0 h × 80 uA +24 h × 10 uA) x 52 ≈ 70 mAh

Design life = Battery capacity ÷ Capacity consumed in 1 year = 2600 mAh ÷ 70 mAh = 37.1 years

5 Service and Support

Downloads

More product manuals, leaflets, brochures, certificates, 2D/3D drawings and other information can be downloaded in the following ways:

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